AD-A123 744 INSTALLATION RESTORATION PROGRAM RECORDS SEARCH FOR CLEAR AIR FORCE STATION ALASKA(U) CH2M HILL GAINESVILLE FL G EICHLER ET AL. OCT 81 F08637-80-G-0010

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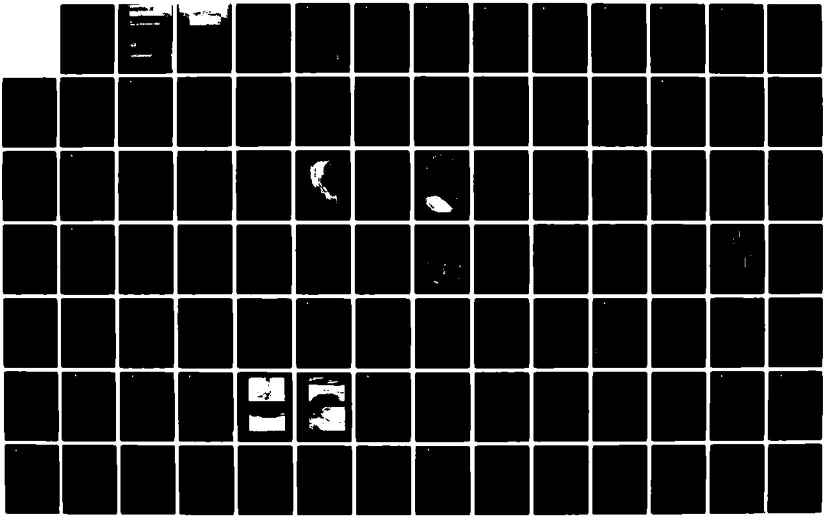

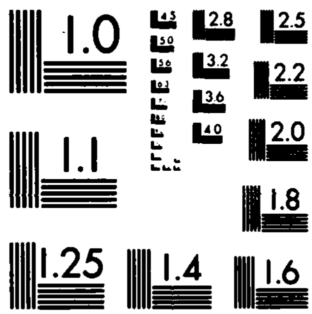


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# REPORT DOCUMENTATION PAGE

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The identification of hazardous waste disposal sites of military installations was directed by Defense Environmental Quality Program Policy Memorandum 80-6. Phase I constitutes a records search to determine the potential, if any, for migration of toxic and hazardous materials off the installation as a result of past operations and disposal activities. The Clear AFS records search included a detailed review of pertinent installation records, contacts with various government and private agencies for documents

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INSTALLATION RESTORATION
PROGRAM RECORDS SEARCH

For

CLEAR AIR FORCE STATION

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403

By

CH2M HILL
Gainesville, Florida

October 1981

Contract No. F080637 80 G0010 0004 01

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# LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

## LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

| | |
|---|---|
| ADCOM | Air Defense Command |
| AFESC | Air Force Engineering and Services Center |
| AFS | Air Force Station |
| BMEWS | Ballistic Missile Early Warning System |
| CE | Civil Engineering |
| DEW | Distant Early Warning |
| DOD | Department of Defense |
| DPDO | Defense Property Disposal Office |
| DSO | DEW Systems Office |
| EOD | Explosive ordnance disposal |
| EPA | Environmental Protection Agency |
| °F | Degrees Farenheit |
| ft | Foot (feet) |
| FSI | Felec Services, Inc. |
| gpd/ft$^2$ | Gallons per day per square foot |
| gpm | Gallons per minute |
| Max. | Maximum |
| MEK | Methyl ethyl ketone |
| Min. | Minimum |
| msl | Mean sea level |
| MWS | Missile Warning Squadron |
| No. | Number |
| NORAD | North America Air Defense Command |
| N.W. | Northwest |
| OEHL | Occupational and Environmental Health Laboratory |
| PCBs | Polychlorinated biphenyls |
| POL | Petroleum, oil, and lubricants |
| RCRA | Resource Conservation and Recovery Act |
| SAC | Strategic Air Command |
| SACLOG | Strategic Air Command Logistics |
| SOI | Space Object Identification |
| S.W. | Southwest |
| TAC | Tactical Air Command |
| Tech Site | Technical Site--Detection Radar Area |
| USAF | United States Air Force |
| USGS | United States Geological Survey |

EXECUTIVE SUMMARY

## EXECUTIVE SUMMARY

### A. Introduction

1. CH2M HILL was retained by the Air Force Engineering and Services Center (AFESC) on May 15, 1981 to conduct the Alaska DEW Line Records Search under Contract No. F08637 80 G0010 0004. The contract was modified on June 8, 1981 to include Clear AFS Record Search under Modification No. F080637 80 G0010 0004 01.

2. The identification of hazardous waste disposal sites at military installations was directed by Defense Environmental Quality Program Policy Memorandum 80-6 dated June, 1980 and implemented by Air Force message dated December 2, 1980 as a positive action to determine the potential for migration of hazardous or toxic wastes from DOD installations, to prevent migration, and implement clean-up actions as necessary. The Records Search comprises Phase I of the Department of Defense Installation Restoration Program. The main purpose of the Records Search Program is to determine the potential, if any, for migration of toxic and hazardous materials off the installation boundaries as a result of past operations and disposal activities.

3. The Clear AFS Records Search Program included a detailed review of pertinent installation records, contacts with various government and private agencies for documents relative to the Records Search, and an onsite station visit conducted on July 27-28, 1981. Activities conducted during the onsite visit included interviews with past and

present key employees at the station and ground tours of the station to identify past disposal and other areas of possible contamination.

4. In the event the Records Search indicates the potential exists for migration of hazardous contaminants off the installation, Phase II field work would be conducted to confirm the presence of the specific migrating contaminants and to determine the extent of migration. The restoration or containment of the hazardous waste disposal sites would comprise Phase III of the Installation Restoration Program.

## B. Conclusions

1. No direct evidence was found to indicate migration of contaminants beyond Clear AFS property boundaries has occurred.

2. Evidence from interviews with key station personnel indicates hazardous wastes, primarily PCB-filled capacitors, have been disposed of in landfill operations in the past.

3. Where hazardous materials have been disposed of, the potential exists for migration of pollutants beyond Clear AFS boundaries due to the following factors:

    a. The existence of four past/current landfill sites of which it is known that PCB-filled items and other hazardous materials were disposed of in the past in three of them.

b. Permeable soil conditions with an absence of confining beds.

4. Table 5 lists the 14 sites identified as possible sources of contamination and the overall rating scores. The following sites were identified as areas showing the highest potential for contaminant migration and warrant additional study:

   a. Sites No. 1, 2, 3, and 4--past/current landfills.

   b. Sites No. 12 and 13--partially filled drums, some of which were leaking.

   c. Site No. 15--Lake Sansing percolation pond.

5. Sites No. 5, 6, 7, 8, 9, 10, 11, and 14 are not considered to pose a significant hazard due to migration nor to pose a significant health hazard. Therefore, these sites do not warrant additional study.

C. Recommendations

1. Although no direct evidence of hazardous contaminant migration was found during the Records Search, it is recommended that a limited program (Phase II) be implemented to verify the fact that contaminant migration is not a problem at Clear AFS. A preliminary scope of work for Phase II follow-up is as follows:

- Ground-water monitoring and/or soil sampling at past/current landfills--Sites No. 1, 2, 3, and 4.

- Location, sampling, removal of drums and soil sampling at Sites 12 and 13 as well as surveying the entire station for other possible drum disposal sites.

- Surface-water and bottom sediment sampling at Lake Sansing. Also, fish tissue analysis.

2. In the event that contaminants are detected in samples collected from the wells, the Lake or from soil samples, a more extensive field survey should be implemented to determine the lateral/areal extent of contaminant migration. Details of the program outlined above, including the exact location of sampling points, should be finalized as part of the Phase II program.

# I. INTRODUCTION

# I. INTRODUCTION

## A. Background

The Air Force Engineering and Services Center (AFESC) retained the engineering firm of CH2M HILL to assemble a team of experts to conduct a Records Search for Clear AFS, Alaska (see Figure 1). Clear AFS is the location of the 13th Missile Warning Squadron (MWS) that is equipped with a Ballastic Missile Early Warning System (BMEWS) and Space Object Identification (SOI). At Clear AFS, a civilian contractor provides operations and maintenance for the site and 13th MWS. The Records Search Program included information from the Air Force and information obtained from the civilian contractor, FELEC Services Incorporated (FSI), contractor since 1975.

The primary legislation governing the management and disposal of solid waste is the Resource Conservation and Recovery Act (RCRA) of 1976. Regulations and implementing instructions for the Act are continuing to be developed by EPA. Under RCRA Section 3012 (Public Law 96-482, October 21, 1981) each state is required to inventory all past and present hazardous waste disposal sites. Section 6003 of RCRA requires Federal agencies to assist EPA and make available all requested information on past disposal practices. It is the intent of the Department of Defense (DOD) to comply fully in these as well as other requirements of RCRA. Simultaneous to the passage of RCRA, the DOD devised a comprehensive Installation Restoration Program (IRP). The purpose of the IRP is to identify, report, and correct environmental deficiencies from past disposal practices that could result in ground-water contamination and probable migration of contaminants beyond DOD installation boundaries. In response to RCRA and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of

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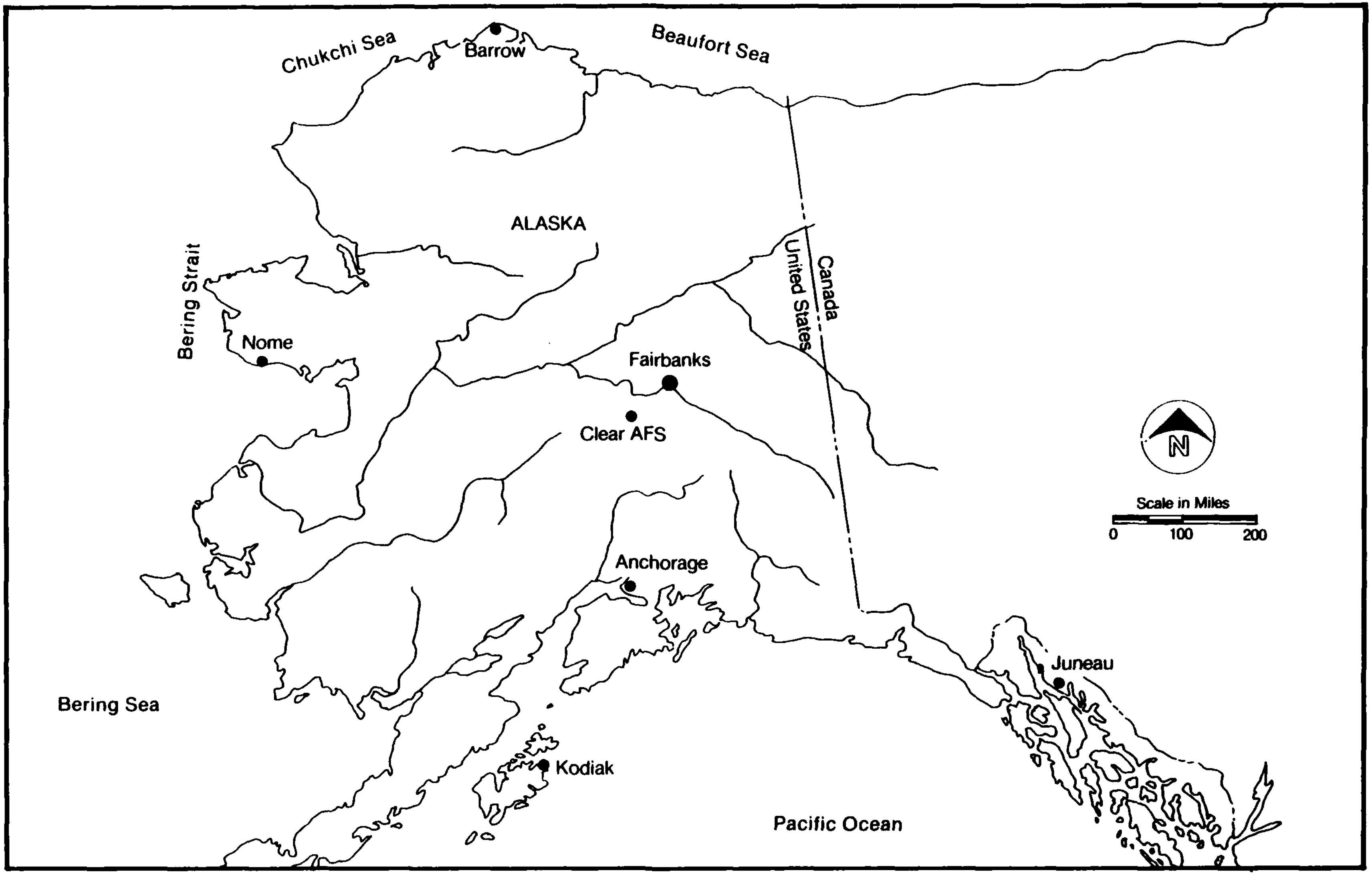


**FIGURE 1.** Location map—Clear AFS.

1980, the DOD issued Defense Environmental Quality Program Policy Memorandum 80-6 (DEQPPM 80-6) on 24 June 1980 which directed the implementation of the IRP program.

The Records Search comprises Phase I of the Department of Defense (DOD) Installation Restoration Program and is intended to review installation records to identify possible hazardous waste contaminated sites. Phase I, the Records Search phase, is the identification of potential problems. Phase II is the quantification of the problem and determination of corrective measures that may be required. The third phase is to contain, correct, and/or mitigate identified potential environmental hazards that may be the result of contaminant migration from the installation.

## B. Authority

The identification of hazardous waste disposal sites at military installations was directed by Defense Environmental Quality Program Policy Memorandum 80-6 (DEQPPM 80-6) dated 24 June 1980 and implemented by Air Force Message dated 2 December 1980 as a positive action to ensure compliance of military installations with the Resource Conservation and Recovery Act (RCRA) and implementing regulations.

To conduct the Installation Restoration Program Records Search for Clear AFS, Alaska, the AFESC retained CH2M HILL on May 15, 1981 under Contract No. F08637 80 G0010 0004 and Modification No. F08637 80 G0010 0004 01.

## C. Purpose of the Records Search

The main purpose of the Records Search Program is to identify the potential for ground-water contamination resulting from past practices of disposal of hazardous and toxic wastes. Also, the Records Search Program assesses the

possibility of contaminant migration beyond the installation boundaries. Pertinent information includes the history of operations, the geological and hydrogeological conditions which contribute to the migration of contaminants off the installation, and the ecological settings which indicate sensitive habitats or evidence of environmental stress resulting from contaminants.

## D. Scope

The Records Search consisted of a pre-performance meeting, an onsite visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at the office of FELEC Services, Inc. (FSI), Colorado Springs, Colorado, on June 11 and 12, 1981. Attendees included representatives of AFESC, Tactical Air Command (TAC), Strategic Air Command (SAC), FSI, Occupational and Environmental Health Laboratory (OEHL), DEW Systems Office (DSO), and CH2M HILL. The purpose of the pre-performance meeting was to provide detailed project instructions for the Records Search, develop a project schedule, provide clarification and technical guidance by AFESC, and define the responsibilities of the station, the command, the contractor, and AFESC participating in the Clear AFS Records Search.

The onsite visit was conducted by CH2M HILL on July 27-28, 1981. Activities performed during the onsite visit included a detailed search of installation records, a ground tour of the installation, and interviews with former and present key station personnel. The following individuals comprised the CH2M HILL Records Search team:

1. Mr. Gary E. Eichler, Project Manager/Hydrogeologist (M.S., Engineering Geology, 1974).

2. Mr. Brian H. Winchester, Ecologist (B.S., Wildlife Ecology, 1973).

3. Ms. Barbara J. Britt, Technician (Pre-engineering).

Resumes of these team members are included in Appendix B.

In the course of the Records Search, various government and private agencies were contacted for pertinent documents and information. Appendix C provides a list of agencies contacted during the Record Search.

Key individuals from the Air Force who participated in the Clear AFS Records Search are as follows:

1. Capt. Richard Merryfield, SACLOG Command Representative.

2. Lt. Jim Curran, Command Environmental Engineer (SAC/DEEVQ)

3. Capt. David Salz, Clear AFS Civil Engineer.

## E. Methodology

The methodology utilized in the Clear AFS Records Search is shown graphically on Figure 2. First, a review of past and present industrial operations is conducted at the station. Information is obtained from available records such as shop files and real property files, as well as interviews with past and present station employees from most operating areas of the station.

The next step in the activity review process is to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from

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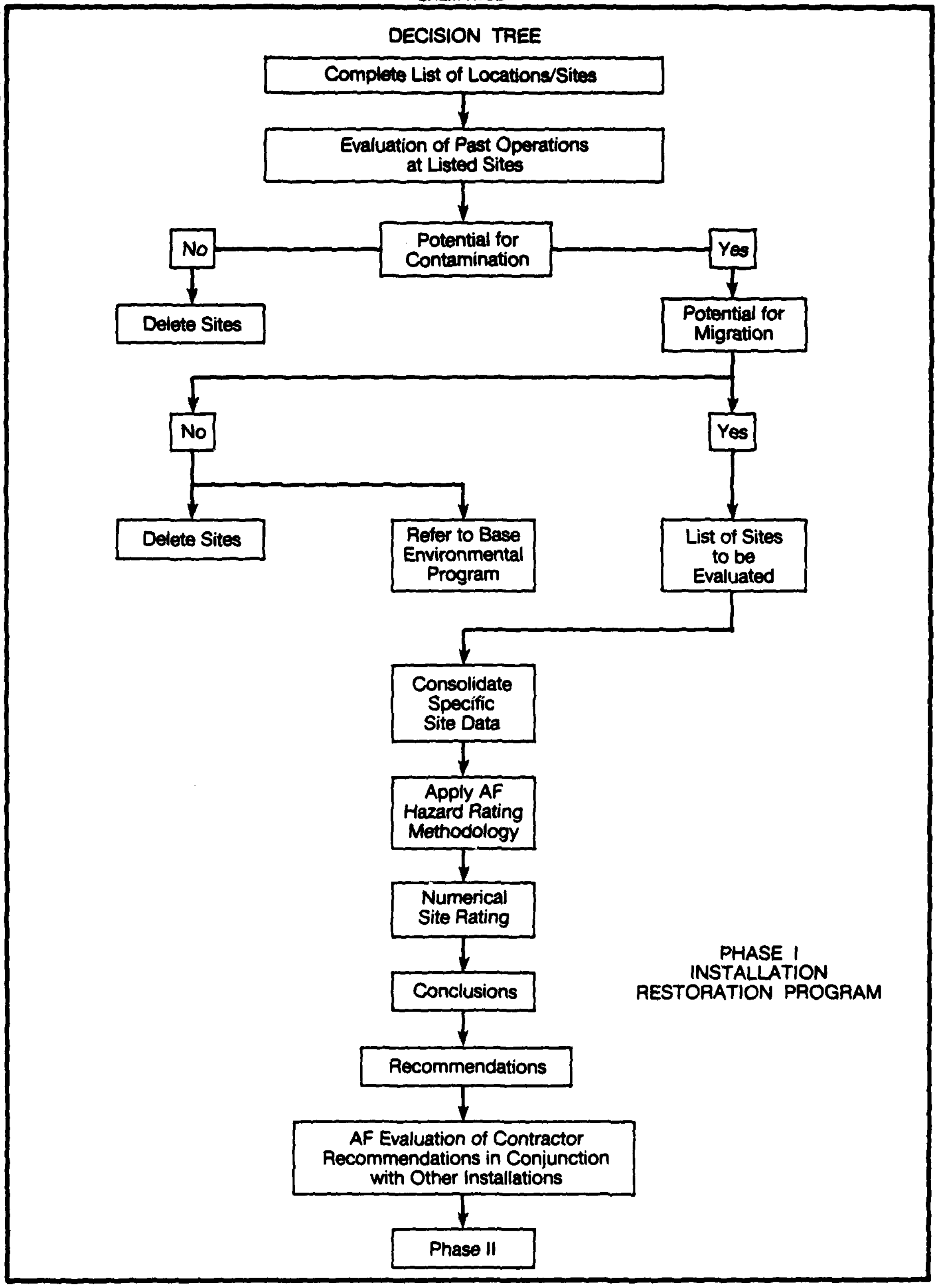


**FIGURE 2.** Records Search Methodology.

the various industrial operations at Clear AFS. Included in this part of the activities review is the identification of all past landfill sites and burial sites; as well as any other possible sources of contamination such as major PCB or solvent spills, or fuel-saturated areas resulting from large fuel spills or leaks.

A general ground tour of identified sites are then made by the Records Search Team to gather site-specific information including (1) evidence of environmental stress, (2) the presence of nearby drainage ditches or surface-water bodies, and (3) visual inspection of these water bodies for any obvious signs of contamination or leachate migration.

A decision is then made, based on all of the above information, whether a potential exists for hazardous material contamination in any of the identified sites. If not, the site is deleted from further consideration. If minor operations and maintenance deficiencies are noted during the investigations, the condition is reported to station commander.

For those sites where a potential for contamination is identified, a determination of the potential for migration of the contamination off the installation boundaries is made by considering site-specific soil and ground-water conditions. If there is little potential for contaminant migration, then the site is deleted from further consideration. If the potential for contaminant migration is considered significant, then the site is evaluated and prioritized using the site rating methodology described in Section IV. B "Disposal Sites Identification and Evaluation."

The site rating indicates the relative potential for contaminant migration at each site. For those sites showing a higher potential, recommendations are made to quantify the

potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a medium potential, a limited Phase II program may be recommended to confirm that a serious contaminant migration problem does not exist. For those sites showing a lower potential, no further follow-up Phase II work would be recommended.

# II. INSTALLATION DESCRIPTION

## II. INSTALLATION DESCRIPTION

### A. Location

Clear Air Force Station, Alaska, is located 78 miles southwest of Fairbanks on the Parks (Fairbanks/Anchorage) Highway at approximately 64° 17' north latitude and 149° 10' west longitude. The Nenana River forms the western boundary of the Station. The nearest settlement is Anderson, which is located approximately 5 miles north of Clear AFS. Clear AFS contains 35,000 acres, 4,600 of which are considered semi-improved. Figure 3 illustrates physical features in the vicinity of Clear AFS. The location of Clear AFS is shown on Figure 1.

### B. Organization and Mission

The land at Clear Air Force Station was originally purchased during WW II as a bombing range. In 1960, construction was begun to establish this radar installation run by the 13th Missile Warning Squadron (MWS) formerly under ADCOM until it was absorbed by SAC.

The primary mission at this site is the timely and accurate transmission of Ballistic Missile Early Warning System (BMEWS) data to the Missile Warning Center in NORAD's Cheyenne Mountain Complex. The site's secondary mission is to detect and perform real-time early analysis of new foreign missiles or satellite launches and to monitor behavior of earth orbiting satellites, both payloads and debris. The intelligence analysis is performed on these objects by the Space Object Identification (SOI) Section.

To perform the BMEWS/NORAD tasking and the SOI function, there are two complementary orgnizations: a civilian contractor, and the 13th Missile Warning Squadron (MWS).

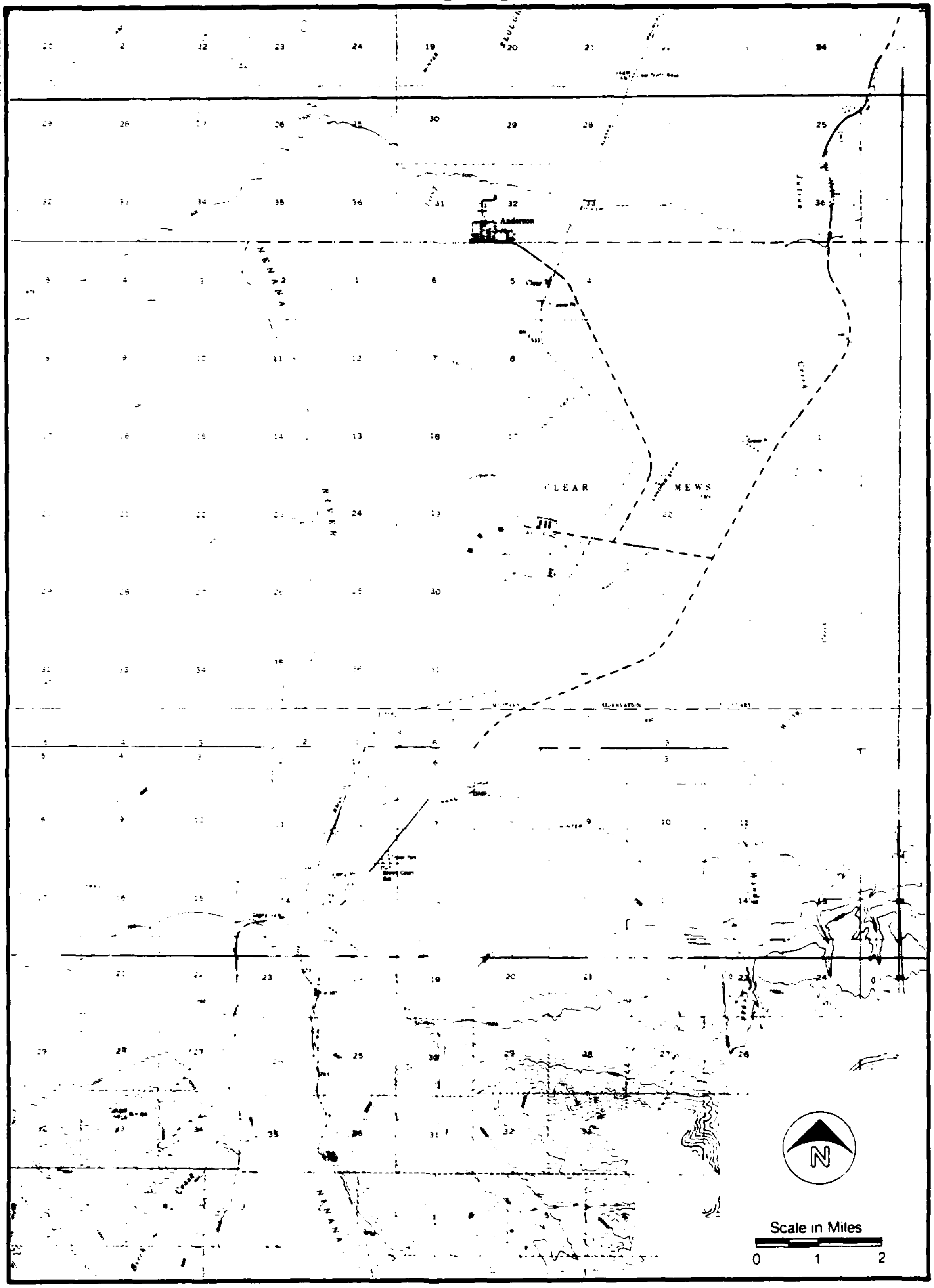


**FIGURE 3.** Clear AFS, vicinity map.

The civilian contractor since 1975 has been FELEC Service, Inc. (FSI), which provides all operation and maintenance for the site and the 13th MWS. The 13th MSW responsibilities include contractor monitoring operations through administration, civil engineering, security, and logistics.

The power plant is operated by Civil Service employees under the direction of the 13th Missile Warning Squadron/Civil Engineering, and provides the services necessary for power generation and fire protection to guarantee continual operation of the detection radar, tracking radar, missile impact prediction computers, and living areas which are operated and maintained by FSI.

# III. ENVIRONMENTAL SETTING

## III. ENVIRONMENTAL SETTING

### A. Meteorology

Clear AFS station is located in the continental climatic zone which covers the interior of Alaska. Generally, both summer and winter temperatures are extreme and precipitation is light.

Alaska is located at a high latitude, and sun angle is comparatively low, especially in the winter. As a result, very little solar energy is received during the winter months. Warm winds generated in lower latitudes (the Westerlies) circulate around the state, counteracting the deficit and moderating temperatures. Alaska receives the most solar energy during the summer months when northern latitude is tilted toward the sun. However, much of this energy never reaches the surface; it is absorbed or reflected by the extensive cloud cover.

The climatic data recorded at Nenana, (located approximately 12 miles north of Clear AFS) for a period of record of 40 years show the average summer temperatures range between 38° and 72°F. In the winter, average temperatures are between -18° and 24°F. Extreme temperatures recorded at this location range from -69° to 98°F.

Precipitation in this area averages 11 inches, which includes 48 inches of snow. Approximately 10 inches of snow equals 1 inch of water. Table 1 shows average maximum and minumum temperatures and amount of precipitation.

### B. Geology

Clear AFS is located on the Nenana River approximately 78 miles southwest of Fairbanks. This area lies within the

TABLE 1
METEOROLOGICAL DATA AT CLEAR AFS

| Parmeter | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature (F°) | | | | | | | | | | | | |
| Maximum | 45 | 54 | 56 | 71 | 88 | 98 | 84 | 89 | 79 | 64 | 53 | 61 |
| Minimum | -66 | -62 | -59 | -32 | -2 | 27 | 29 | 22 | 7 | -28 | -49 | -69 |
| Average | -10 | -5 | 4 | 37 | 46 | 58 | 62 | 56 | 42 | 25 | 3 | -8 |
| Precipitation (inches) | | | | | | | | | | | | |
| Maximum | 4.0 | 1.8 | 2.6 | 1.5 | 1.7 | 3.5 | 6.8 | 7.4 | 3.5 | 2.2 | 1.5 | 2.4 |
| Mean | 0.7 | 0.5 | 0.4 | 0.3 | 0.6 | 1.4 | 1.8 | 2.3 | 1.3 | 0.6 | 0.4 | 0.3 |

Note: Period of record is 40 years.

Source: "Alaska Regional Profiles--Yukon Region," University of Alaska, Artic Environmental Information and Data Center, 1975.

Tanana-Kuskokwim lowland physiographic province of the Yukon Region of Alaska. Figure 4 illustrates the major physiographic features near Clear AFS.

The topography of the station is an essentially smooth, glacio-fluvial outwash plane at the base of the Alaska range which lies to the south. The ground surface slopes downward to the north, with elevations of 595 feet to 580 feet above mean sea level at the station. A random northeast trending ridge and trough undulation of approximately 5 feet in elevation occurs throughout the area. These mark old stream bed deposits left by the Nenana River as it changed course.

The surficial deposit at Clear AFS consists of a peaty sandy silt approximately 0.5 to 5 feet in thickness. This layer contains varying amounts of gravel and is moderately well to well drained in those areas. The material in this surficial deposit may be locally boggy where silt makes up a large proportion. The surficial material has an estimated permeability of less than 0.01 cm/sec (0.02 ft/min) which is moderately low.

Underlying the surficial silt are interbedded lenses of sand and gravel with cobbles up to 8 inches in diameter. The amount of silt in these beds is variable but averages 10 percent or less. The depositional origin of this material is glacial outwash fans and alluvial stream deposits, and is characterized by an ever-changing mixture of silt size particles up to cobbles. This material was washed down from the higher elevations during spring thaw and summer rains. The larger material is deposited in the stream bed, and progressively finer material is deposited away from the channel. This material can later be reworked and remixed as the stream channel changes. The resulting formation is well graded and should act as a good filter for percolating water.

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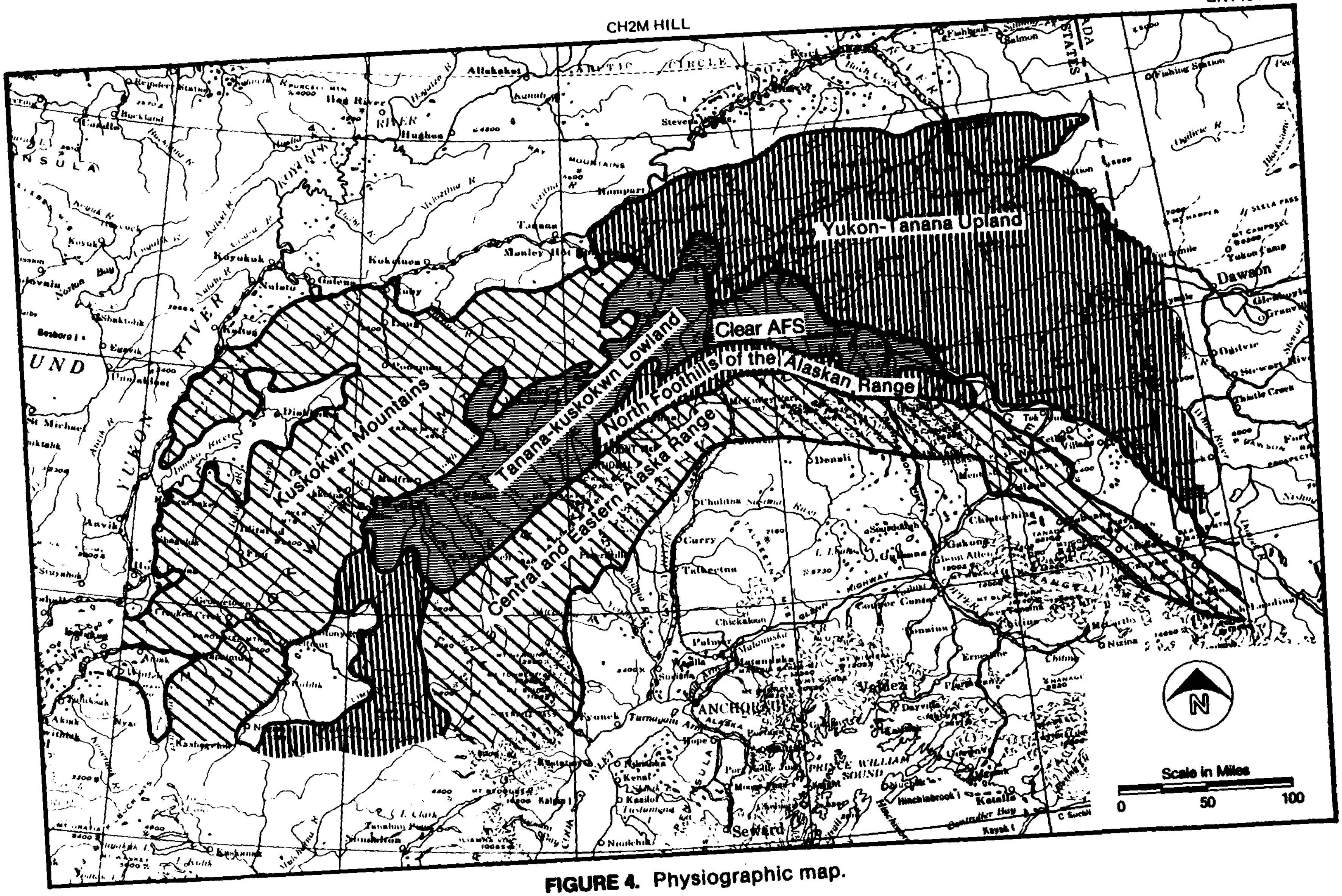


FIGURE 4. Physiographic map.

This strata is approximately 600 feet thick in the Clear area and rests on a Precambrian metamorphic quartz-mica schist known as the Birch Creek Schist. This is the basement rock in the region and characteristically has a weathered surface of varying depth.

Figure 5 is a map of the general geology exposed at or near the surface in the Clear AFS area.

Figure 6 is a geologic log taken from exploratory boring number 42. As can be seen, the geology at Clear AFS is highly variable.

## C. Hydrology

Clear AFS is situated in the Tanana River basin less than 2 miles east of the Nenana River, a major tributary.

The Nenana River is a braided stream draining the higher elevations on the northern slopes of the Alaska range. The headwaters of the river originate in the snowfields and glaciers as meltwater and carry an increasingly larger load of sediment as they flow downstream. The Nenana drains approximately 3,920 square miles of land.

Peak runoff occurs during the summer months from snowmelt and rainfall. There is a potential for flooding at Clear AFS because the northern boundary of the developed portion of the facility is at the highest recorded flood stage elevation of 574 feet msl, where there is a potential for flooding surface contamination, such as fuel spills could enter the Nenana River. Flooding downstream is probable where the valley flattens near the Tanana River.

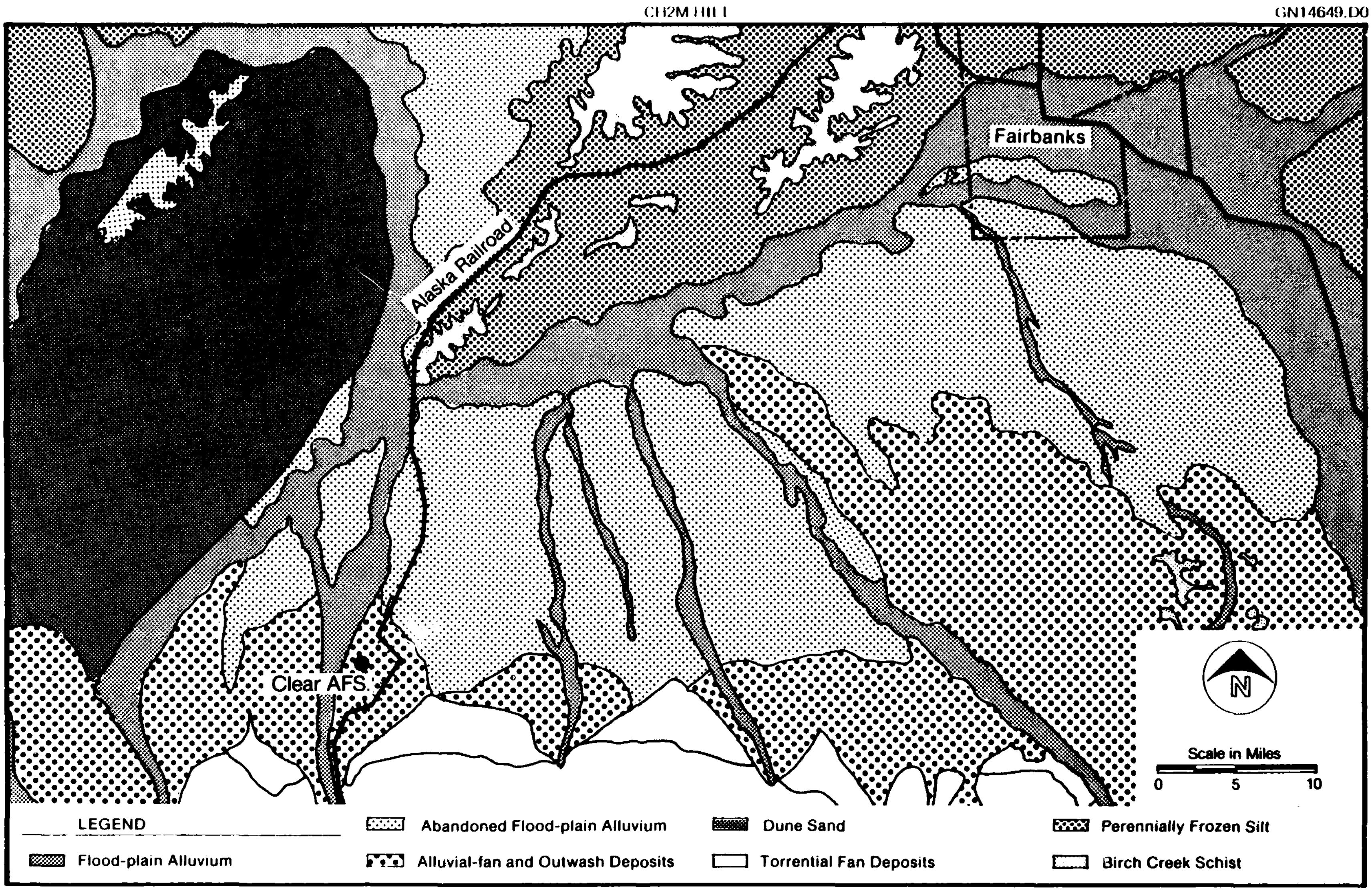


**FIGURE 5.** Geologic map.

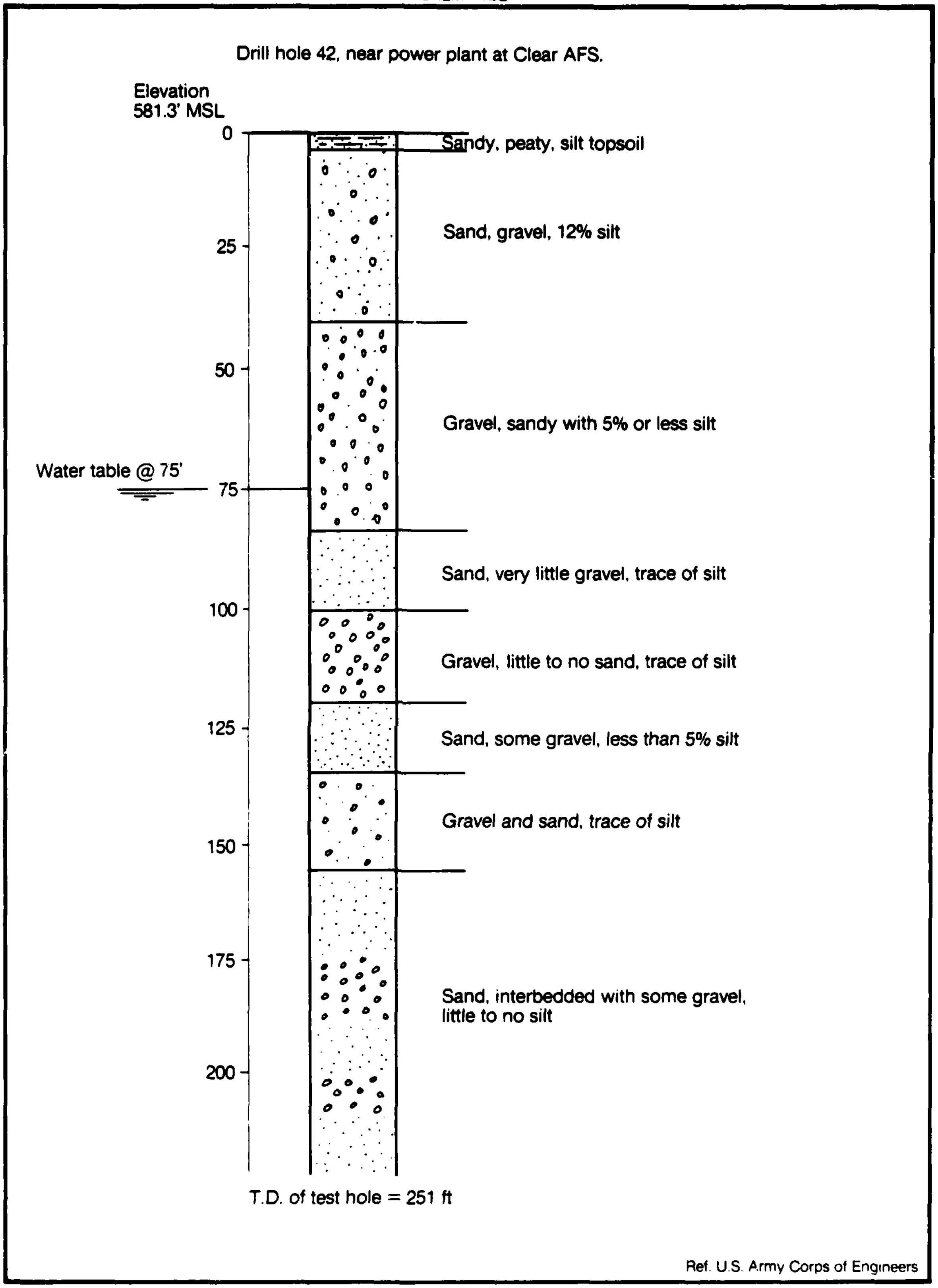


**FIGURE 6.** General geologic column at Clear AFS.

The station drainage is predominantly to the northeast, with some to the northwest into Lake Sansing. The surface slope at the station is 25 feet per mile which allows fairly rapid runoff to the north. Improvements include ditches, culverts, and surface impoundments (Lake Sansing and Borrow Pits). Figure 7 illustrates the general drainage patterns in the area.

Ground water occurs as a water table aquifer at Clear AFS. The static water level is approximately 66 feet to 81 feet below land surface or at an elevation of approximately 514 feet msl. This aquifer is contained in the unconsolidated sands and gravels underlying the site. A hydraulic gradient of approximately 6 feet per mile in a northeast direction has been measured by the USGS. The source of recharge to the aquifer is the Nenana River and vertical percolation of rainfall and snowmelt. Based on these data, together with estimates of aquifer permeability and total saturated thickness, it is estimated that approximately 6,000 to 10,000 million gallons/year flow under the developed portion of Clear AFS. This is a moderately high rate of flow and reflects the permeable deposits in the vicinity. It has been reported that the aquifer outcrops about 5 miles north of the station and forms Clear Creek and several other springheads.

The thickness of the aquifer is unknown, though it probably extends into the Precambrian Basement Rock that underlies the area. The water quality is very good throughout the area, except for the occurrence of high iron in some wells. Table 2 presents water quality analysis for selected wells in use at Clear AFS. The aquifer's areal extent is probably limited to a band 10 to 15 miles wide along the low hills to the south extending from the Teklanika River east to Delta Junction. Recharge to the aquifer locally is probably from the Nenana River.

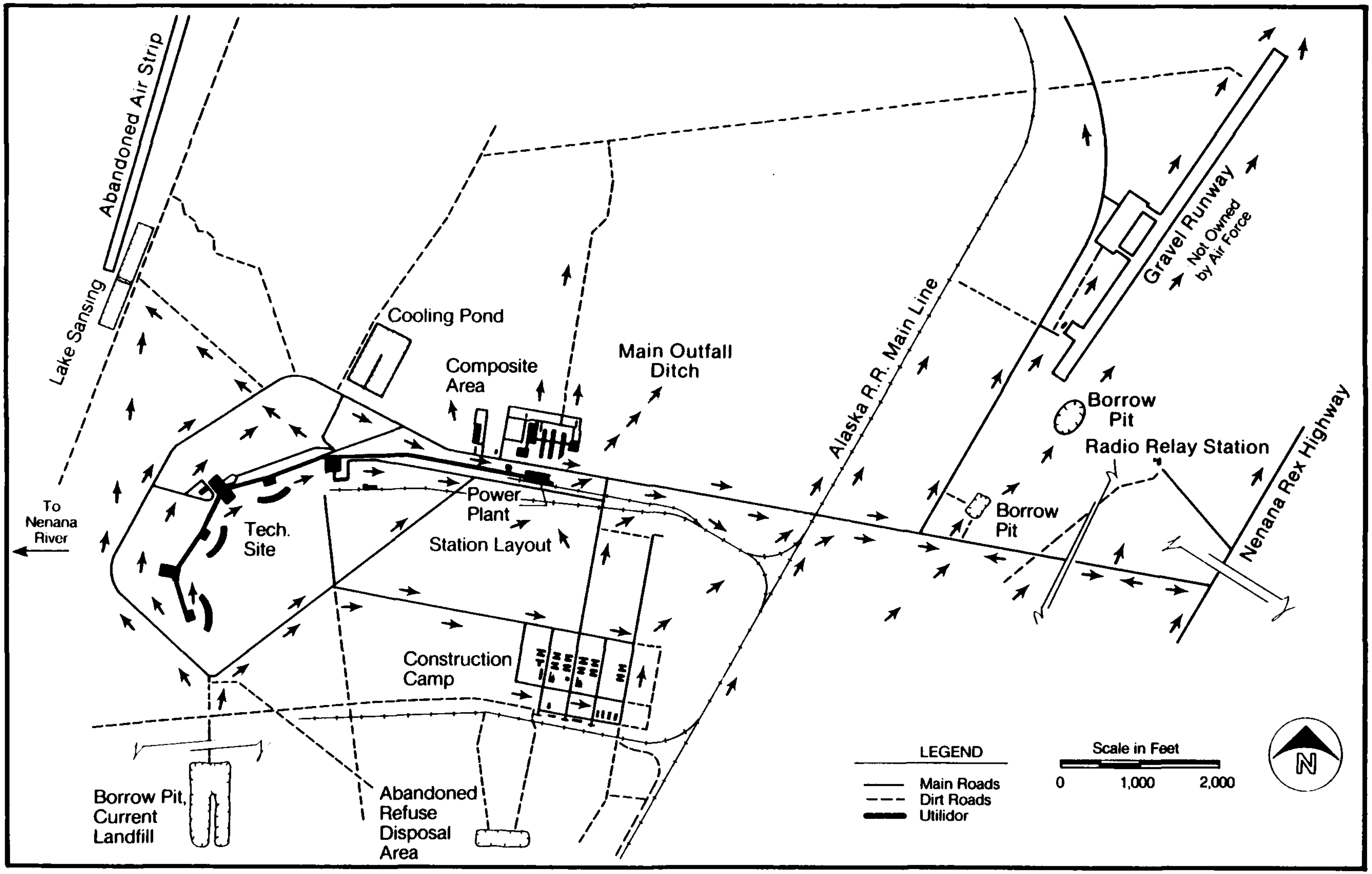


**FIGURE 7.** Surface drainage map of Clear AFS.

Table 2
WATER QUALITY ANALYSIS OF SELECTED WELLS AT CLEAR AFS

| Building Number | Bldg. 582 | Bldg. 5 | Bldg. 111 | Bldg. 129 | Bldg. 204 |
|---|---|---|---|---|---|
| Date of collection | Sept. 5, 1964 | Sept. 5, 1964 | Sept. 5, 1964 | Sept. 5, 1964 | Sept. 5, 1964 |
| **Parameter** | | | | | |
| Silica ($SiO_2$) | 17 | 13 | 8.8 | 8.2 | 12 |
| Iron (Fe) (dis) | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| Iron (Fe) (total) | 0.94 | 0.04 | 0.02 | 0.17 | 0.08 |
| Manganese (Mn) | 1.8 | 0.03 | 0.00 | 0.00 | 0.00 |
| Calcium (Ca) | 53 | 50 | 44 | 43 | 47 |
| Magnesium (Mg) | 7.5 | 12 | 8.5 | 11 | 12 |
| Sodium (Na) | 4.1 | 3.1 | 3.5 | 4.4 | 3.0 |
| Potassium (K) | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| Bicarbonate ($HCO_3$) | 205 | 199 | 144 | 138 | 187 |
| Carbonate ($CO_3$) | 0 | 0 | 0 | 0 | 0 |
| Sulfate ($SO_4$) | 3.8 | 9.6 | 31 | 39 | 12 |
| Chloride (Cl) | 1.4 | 1.4 | 4.3 | 5.0 | 1.4 |
| Fluoride (F) | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Nitrate ($NO_3$) | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 |
| Carbon Dioxide ($CO_2$) | 10 | 8.0 | 4.6 | 3.4 | 4.7 |
| Dissolved solids | | | | | |
| Calculated | 188 | 187 | 171 | 179 | 180 |
| Residue on evaporation at 180°C | | | | | |
| Hardness as $CaCO_3$ | 163 | 173 | 145 | 154 | 165 |
| Noncarbonate hardness as $CaCO_3$ | 0 | 10 | 27 | 41 | 12 |
| Alkalinity as $CaCO_3$ | 168 | 163 | 118 | 113 | 153 |
| Specific conductance (micromhos at 25°C) | 316 | 326 | 290 | 300 | 312 |
| pH (standard units) | 7.5 | 7.6 | 7.7 | 7.8 | 7.8 |
| Color (APHA units) | 5 | 5 | 5 | 5 | 5 |

Notes: 1. Analyses completed by U.S. Geological Survey. See Figure 6 for well locations.
2. All units expressed in parts per million unless otherwise noted.

The water for Clear AFS is supplied by 13 electrically powered wells and two diesel powered standby wells. The wells are from 6 to 20 inches in diameter and are approximately 150 feet deep. They are screened and gravel packed, with typical specific capacities of 300 to 600 gpm per foot of drawdown. Well locations were provided by station personnel and are shown in Figure 8.

Due to the proximity of the station to the Nenana River which provides a warm source of recharge water and because the strata above the water table is very permeable, there is little to no permafrost underlying the area. Some frozen ground was reported near the surface during soil excavations for the station, but no other occurrences have been reported. The low silt content in the formations allows for the free movement of water within the aquifer. The high transmissivity and constant recharge source allow for a relatively rapid ground-water movement, providing an adequate thermal source to prevent permafrost formation.

The vertical permeability of the aquifer is relatively high estimated to be 0.10 cm/sec (0.20 ft/min). The absence of extensive silt or clay beds allows percolation of water and/or contaminant into the aquifer to occur very rapidly once the surficial silt and organics are breached. Upon reaching the water table, denser material would continue to migrate downward to the base of the aquifer. Less dense fluid would spread and mix with the ground water and move downgradient to a point of discharge.

D. Environmentally Sensitive Conditions

The natural habitats on Clear AFS are comprised mostly of mixed spruce-hardwood forests, with black spruce (Pica mariana), paper birch (Betula papyrifera), quaking aspen (Populus tremuloides) and balsam poplar (Populus balsamifera)

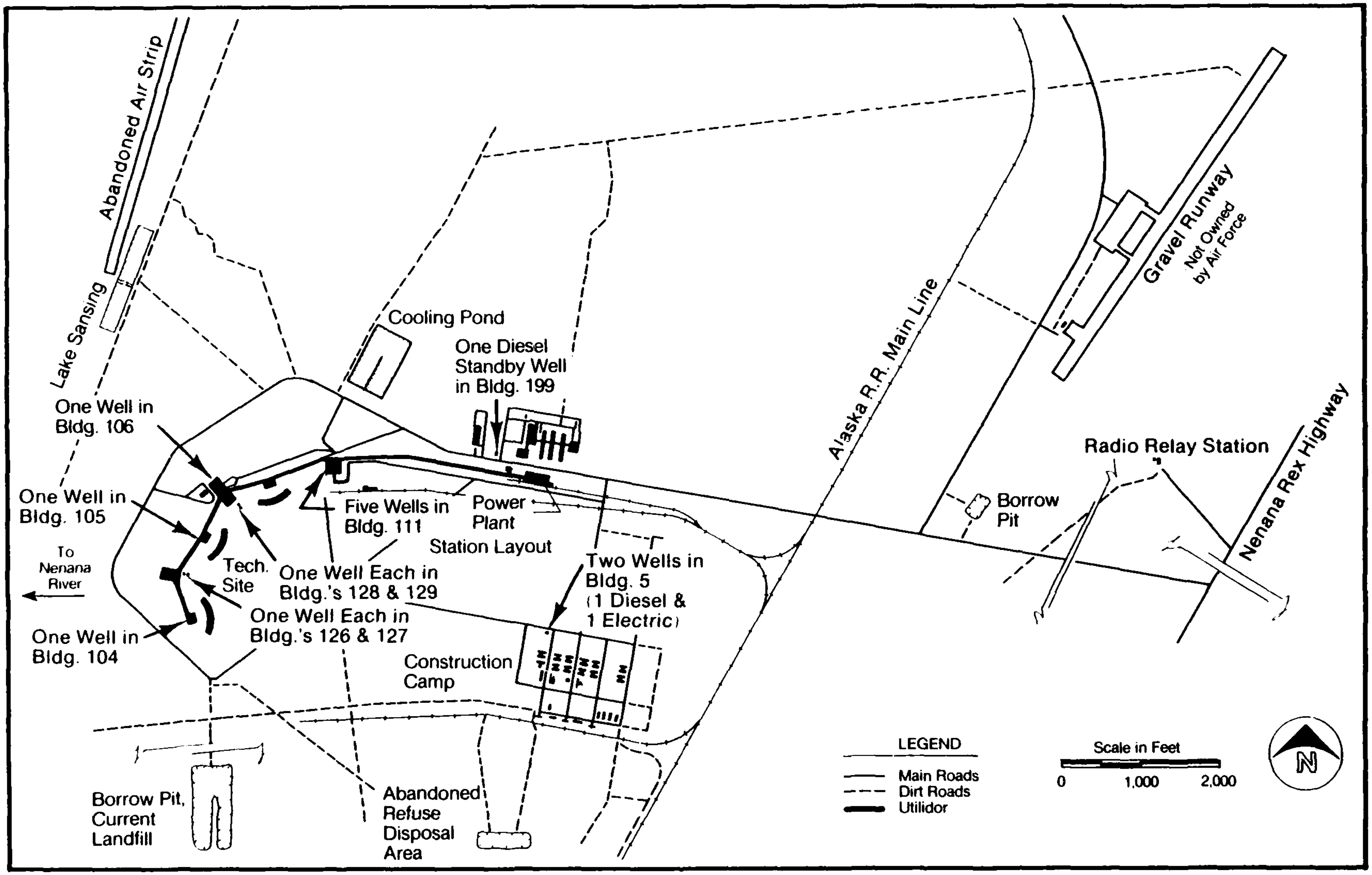


**FIGURE 8.** Well location map—Clear AFS.

being the primary tree species. These forests for the most part have not been impacted by activities on Clear AFS (except where clearing has been necessary) and due to their extensive distribution in the region, should not be considered environmentally sensitive habitats.

During a ground survey of the developed portion of the site, there were no areas observed that appeared to be environmentally stressed.

The Nenana River, which forms the western boundary of Clear AFS, should be considered an environmentally sensitive habitat due to the greater vulnerability of such aquatic habitats to chemical or other hazardous waste contamination. However, there has been no evidence of any Air Force related contamination or adverse impacts on the Nenana River system.

Three species listed as endangered by the U.S. Fish and Wildlife Service occur in Alaska: the peregrine falcon (Falco Peregrinus), Aleutian Canada goose (Branta canadensis leucopareia), and eskimo curlew (Numenius burealis). Of these, only the peregrine falcon is likely to occur in the study area, most likely along the Nenana River. It should be noted that species such as the bald eagle, gray wolf, and grizzly bear do not have endangered/threatened status in Alaska.

# IV. FINDINGS

## IV. FINDINGS

### A. Activity Review

#### 1. General

Major activities at Clear AFS generating industrial wastes include operation of the BMEWS technical site; power generation; vehicle and equipment maintenance; and corrosion control measures. Other wastes are associated with photo laboratories, pest control, training activities (i.e. fire-fighting), and building maintenance. Table 3 lists activities at Clear AFS and waste generated by each.

#### 2. Industrial Operations

The BMEWS Technical Site currently contains 1,440 non-PCB capacitors. These were installed in 1979-1980 to replace former capacitors which contained PCB dielectric fluid. The capacitors being replaced were sent to Eielson AFB for proper disposal. During the period from 1960 to 1979 an estimated 500 PCB-containing capacitors were replaced on-line, the old capacitors being disposed of in the past/current landfills. In most cases the capacitors were ruptured during the landfill disposal operation, allowing the escape of the dielectric fluid (about 3 gallons per capacitor).

The Tech Site also contains 12 large transmitters, each filled with about 1,000 gallons of non-conductive, non-PCB silicon oil (EE CA-10). The transmitter oil is periodically removed, filtered, and reused, and when no longer useable, it is applied as a road palliative. The cooling water system for the transmitters contains hexavalent chromium for corrosion control and since this is a closed system, it is normally not released into the environment.

Table 3
ACTIVITIES ON STATION AND WASTES GENERATED BY EACH

| Activity | Location | Waste Material | Waste Quantity | T/S/D Methods 1950 1960 1970 1980 | |
|---|---|---|---|---|---|
| BMEWS | Tech Site | PCB Capacitors | 3 capacitors/mo | Landfill | DPDO via Eielson AFB |
| | | Silicon Transmitter Oil | 25 gal/mo. | Road Palliative | |
| | | Domestic Wastewater | 7,900 gal/day | Septic Tanks<br>Lake Sansing | |
| | | Cardboard/Fiberglass (Radome) | 1,000 cu yd (one time) | | Landfill[a] |
| | | Cooling Water | 3 million gal/day | Percolate to Ground Water → Lake Sansing | |
| | | Klast[illegible]n Tubes | 2 tubes/yr | Landfill | DPDO via Eielson AFB |
| | | Waste POL | 10 gal/mo. | Burned as Training Exer. | |
| | | Asbestoes Pipe Insulation | 200 lb/yr | Landfill | |
| | | Cleaning Solvents | 5 gal/mo. | Landfill | DPDO via Eielson AFB |
| | | Tracking Radar Cleaning Solvent | 230 gal/mo. | Landfill | |
| | | Chromium Sludge | 10 lb/mo. | Landfill | |
| | | Insulating Oil | 250 gal/mo. | Road Palliative | DPDO via Eielson AFB |
| BMEWS Support | Composite Area & Construction Camp | Domestic Wastewater | 149,000 gal/day | Imhoff Tank<br>Leach Field | |
| | | Asbestoes Insulation | 1,000 lbs/yr | Landfill | |
| | | Waste POL | 10 gal/mo. | Burned as Training Exer. | DPDO via Eielson AFB |
| Power Generation | Power Plant | Cooling Water | 1.5 million gal/day | Percolate to Ground Water → Lake Sansing | |
| | | Boiler Blow Down | 300 gal/min. | | |

Table 3 Continued

| Activity | Location | Waste Material | Waste Quantity | T/S/D Methods 1950 1960 1970 1980 | |
|---|---|---|---|---|---|
| | | Flue Stack Gasses | -- | Atmosphere | |
| | | Fly Ash | 1,000 cy/mo. | Landfill and/or Roads | Landfill |
| | | Asbestoes Insulation | 200 lb/yr | Landfill | |
| | | Waste POL | 20 gal/mo. | Burned as Training Exer. | DPDO via Eielson AFB |
| | | Domestic Wastewater | 900 gal/day | Septic Tank Leach Field | |
| | | Caustic Soda | 2,000 lb/mo. Neutralized | Lake Sansing | |
| | | Sulfuric Acid | 6,500 lb/mo. Neutralized | Lake Sansing | |
| Fish Hatchery | Hatchery Building | Domestic Wastewater | 50 gal/day | Percolate to Ground Water; Lake Sansing | |
| Photo Lab | | Wastewater | 10 gal/day | Septic Tank Lake Sansing | |
| | | Silver | <1 lb/mo. | Septic Tank | Recovered |
| Pest Control | | Malathion Container | 10 cans/yr | | Empty Container to Landfill |
| | | Hericide Borot Containere | 5 cans/yr. | | Empty Container to Landfill |
| | | Rodent Bait Container | 10 cans/yr. | | Empty Container to Landfill |
| Motor Pool/Vehicle Maintenance | | Mogas Sludge | -- | Landfill | DPDO |
| | | Waste POL | 55 gal/mo. | Burned As Training Exer. | DPDO |

Notes: ——— = Time frame confirmed by shop personnel.
.......... - Time frame assumed by shop personnel.
T/S/D - Treatment, Storage, or Disposal.
[a]Two 20,000-gallon POL waste storage tanks; final disposition was sale to contractors and fire training.

However, it is occasionally necessary to clear and flush the cooling system and dispose of chromate-treated transmitter cooling water. Normal procedure when dumping cooling water is to chemically convert hexavalent chromium to the less toxic trivalent form. This is followed by precipitation and removal of trivalent chromium as chromic hydroxide. The cooling water is then discharged to the drains. This procedure is accomplished by adding sulfuric or hydrochloric acid to lower pH, then adding caustic soda to precipitate chromium. The chromium sludge was likely disposed of in landfills in the past.

The closed cooling system described above is in turn cooled by ground water, pumped from wells on site, passed through the system once and discharged to Lake Sansing. No chemicals are added to this cooling water and there is no hydraulic connection between this system and the closed, chemically treated cooling system. In fact, water from this cooling system is used by a fish hatchery operation located at Clear AFS.

Other wastes from the Tech Site include fiberglass (from the Radome), Klystron and other tubes, asbestos insulation, and waste oils including lube oil, hydraulic oil, insulation oil, and solvents. Klystron tubes, tubes with low-level radioactivity, and drummed waste petrochemicals are now shipped to Eielson AFB, but prior to 1979 all wastes either went to the landfill or were burned. Old asbestos insulation is currently disposed of by placing in double plastic bags and burying in the landfill. Past practice probably consisted of simply dumping in the landfill. Solvents used in equipment cleaning include FO 352 (50 percent methylene chloride, 50 percent perchloroethylene) for degreasing and cleaning tracking radar, PD680, ethyl alcohol, ketone, acetone, oxalic acid, tetrachloroethane, isopropyl alcohol, toluene, methyl ethyl ketone, trichloroethylene, methylene

chloride, and perchloroethylene; waste solvents are disposed of via DPDO currently but likely went to the landfill in the past.

Wastes from the power plant include cooling water, boiler blowdown, flue stack gases, fly ash, waste lube oils, caustics, and absestos insulation. A number of PCB transformers are also present, three of which are suspected of having minor intermittent leaks (though there is no direct documentary evidence of this). Waste cooling water and boiler blowdown discharges ultimately to Lake Sansing, a man-made percolation pond, but is generally relatively clean except for small amounts of oil and grease. (One minor fish kill did occur in Lake Sansing over a year ago, but the causative agent was not established.) Boilers discharge at a rate of 300 gpm, and both caustic soda and sulfuric acid are periodically used for corrosion/scaling control; averaging 24,000 lb/year for caustic soda and 81,000 lb/year for sulfuric acid. Although not a hazardous waste, fly ash is used to cover materials placed in the landfill; it has an iron content of approximately 6 ppm, a manganese content of approximately 9 ppm, and a silicon content of approximately 6 ppm.

Approximately 20,000 tons of coal is stockpiled adjacent to the power plant. Runoff from the coal pile could enter the drainage system to Lake Sansing or infiltrate soil to ground-water system. Coal contains small amounts of maganese, silicon, sulfur, and arsenic.

Waste oils are drummed and sent to Eielson AFB. In the past they were used on roads for dust control, burned in landfill, or burned as a fire training exercise. It was reported that in the early 1960's approximately 50,000 gallons of fuel oil contaminated with water was disposed of by pumping into drainage ditches around the power plant (Site No. 7, Figure 9). Tetraethyl lead sludges are cleaned

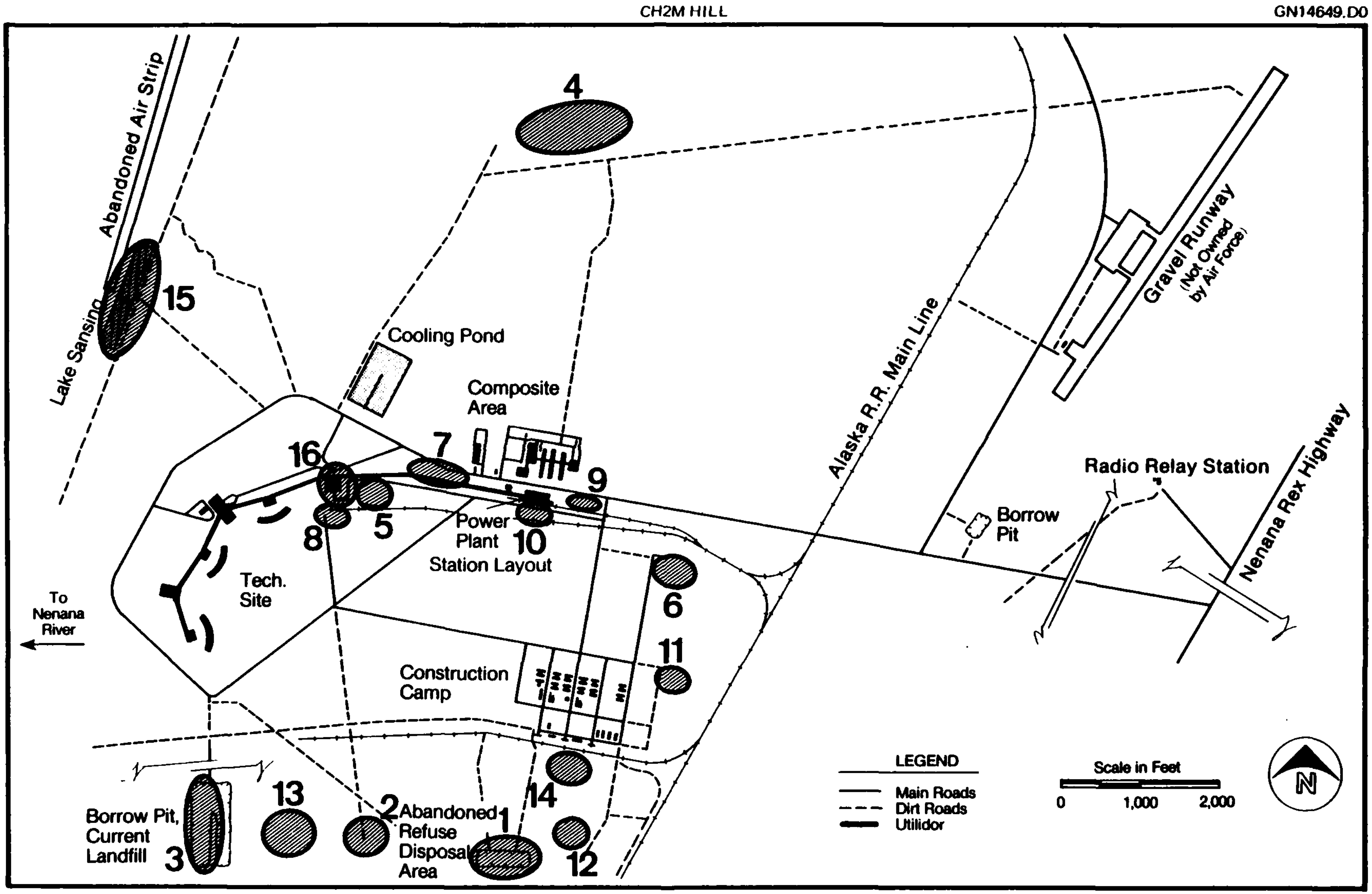


FIGURE 9. Location of possible contaminated areas—Clear AFS.

from fuel oil and MOGAS storage tanks about once every 5 years and are awaiting disposal via DPDO. In the past sludge was likely disposed of in landfills.

### 3. Other Operations

The two photo laboratories on Clear AFS are located in buildings 101 and 209. Although silver recovery is now in operation, prior to 1976 all materials were discharged into septic tanks.

The use of pesticides for mosquito control included applications of DDT up through 1965 and applications of Malathion thereafter. However, the use of Malathion has been reduced since 1975 due to encouragement of swallow nesting on the AFS and the accompanying natural control of mosquito populations. Currently Malathion is used at a rate of approximately 2,000 gal/year; herbicide borate, used for weed control, is applied at a rate of approximately 2,000 lb/year. Rodent bait is used at an annual rate of 3 lb/year. Fertilizer and lime are used at a rate of 5,000 lb/yr, and 1,000 lb/yr, respectively. Orthodiquat is used in the cooling pond to control growth of aquatic needs and is applied in May and September.

Some waste oils used to be burned during the fire-fighting training exercises. This practice was stopped in 1976. Asbestos insulation has also been removed from some non-industrial buildings around the site, the material being disposed of by wetted double-bagging and placement in the landfill.

## B. Disposal Sites Identification and Evaluation

Interviews with past and present key employees of both the Air Force and FSI resulted in the identification of 16 sites at Clear AFS which were hazardous. The sites

included five current or former landfills and six other waste/potentially contaminated area sites. Also identified from interviews and site inspection were three sites where chemical and petroleum spills or containers were found. Two sites were reviewed and eliminated from further study since they had no potential for migration.

These sites, illustrated on Figure 9, were reviewed and those which had a potential for migration were evaluated using a rating system for prioritized ranking of the hazard potential of waste disposal facilities developed by JRB Associates, Inc., of McLean, Virginia, for the U.S. Environmental Protection Agency. This system was modified by CH2M HILL and Engineering Science for specific application to the Air Force Installation Restoration Program.

The JRB system consists of 31 rating factors, divided into 4 categories: receptors, pathways, waste characteristics, and waste management practices, which are used to evaluate the principal targets of contamination, the mechanisms for migration, the hazards posed by the contaminants, and the facilities' design and operation, respectively. Relative scores from each category are combined to give an overall score using appropriate weighting factors. A more detailed description of this hazard evaluation methodology is included in Appendix E.

The following is a brief description of each site identified during the Records Search and site visit at Clear AFS. Copies of the rating forms completed for each site as rated are included in Appendix F. A summary of the results of the site assessment, using the modified rating system, is given in Table 4.

Table 4
SUMMARY OF RESULTS OF SITE ASSESSMENTS[a]

| Site[b] No. | Site Description | Subscores (%) of Maximum Possible Score in Each Category: Receptors 0.22 | Pathways 0.30 | Waste Characteristics 0.24 | Waste Management Practices 0.24 | Average Score (Weighted Average) |
|---|---|---|---|---|---|---|
| 1 | Landfill--1959-1968 | 56 | 35 | 100 | 74 | 64 |
| 2 | Landfill--1968-1975 | 56 | 35 | 100 | 69 | 63 |
| 3 | Landfill--1975-Present | 67 | 35 | 100 | 69 | 66 |
| 4 | Landfill--Prior to 1959 | 52 | 35 | 50 | 57 | 48 |
| 5 | Coal Storage Area | 66 | 22 | 50 | 24 | 39 |
| 6 | Leachate Field--Imhoff | 63 | 35 | 40 | 27 | 40 |
| 7 | 50,000-gal oil spill site--early 1960's | 66 | 22 | 60 | 48 | 47 |
| 8 | Underground storage tanks behind Power Plant, 200-gal fuel spill | 66 | 28 | 50 | 31 | 42 |
| 10 | Radioactive Materials Storage Building | 72 | 22 | 50 | 44 | 45 |
| 11 | Fire Training Area | 66 | 20 | 40 | 44 | 41 |
| 12 | Drums near gravel pit | 63 | 35 | 50 | 44 | 47 |
| 13 | Drums ~1 mile south of Power Plant | 52 | 35 | 50 | 44 | 47 |
| 14 | Constructon Camp disposal area | 66 | 20 | 30 | 57 | 41 |
| 15 | Lake Sansing | 63 | 35 | 50 | 44 | 47 |

[a]Basis of rating system developed by JRB Associates, Inc. of McLean, Virginia, and modified by CH2M HILL and Engineering-Science for application to Air Force Installation Restoration Program Records Search.

[b]Sites 9 and 16 were eliminated from further study and therefore were not rated. Figure 9 illustrated the the location of each site.

1. Landfills

The landfills identified at Clear AFS include four past sites and one current site. Two of the past sites as well as the current site are known to contain PCB capacitors disposed of in compliance with regulations at the time, as well as other known hazardous materials such as asbestos, solvents, paints, chromate sludges, tetraethyl lead sludges, and waste oils. The fourth and oldest landfill was used prior to the construction of BMEWS and therefore little is known of its contents. The fifth site (Site No. 14) was used as a construction disposal site during the building phase at Clear AFS. Figure 10 illustrates a summary of landfill operations and the associated operational history of each.

Landfills at Clear AFS for the most part consist of borrow pits excavated for fill either for the construction of the station or the Alaska Railroad. The landfills used by the site during its operational years (Sites 1, 2, and 3) are approximately 500- to 1,000-feet-long, approximately 300- to 400-feet wide, and approximately 40- to 60-feet deep. Waste disposed of in the past was burned daily up until 1976 when burning ceased. The two older landfills (Sites 1 and 2) were covered with fly ash and topped with soil up to the surrounding natural ground elevation. The current, active landfill (Site No. 3) is covered daily with fly ash from the power plant. Little is known of the operation of the other two landfills (Sites 4 and 14).

One of these landfills (Site No. 4) was used during the time that Clear AFS was used as a bombing range piror to the construction of the BMEWS. This site is covered with soil and graded level with surrounding land surface.

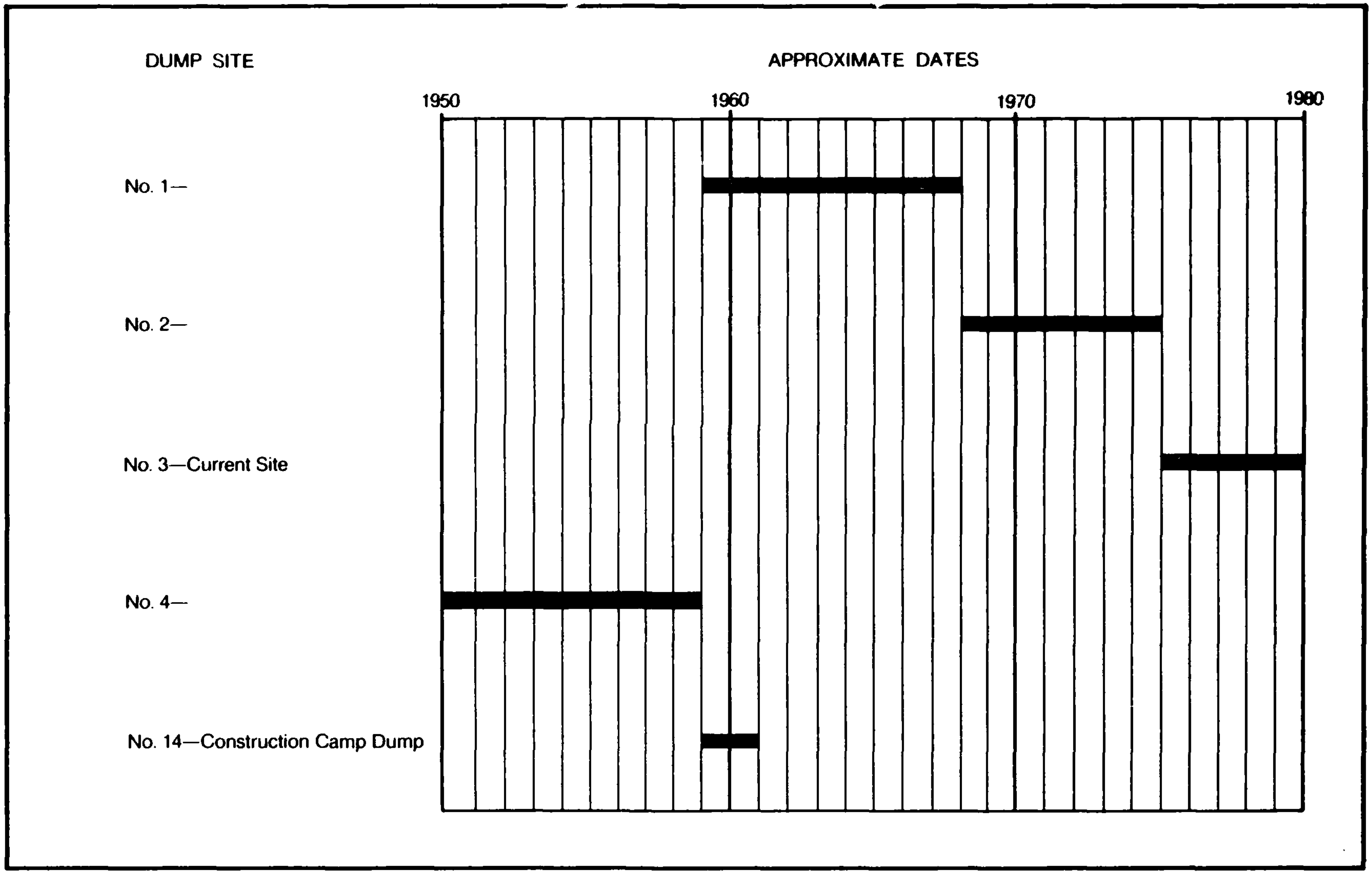


**FIGURE 10.** Historical summary of landfill activities at Clear AFS.

The other landfill (Site No. 14) was used during the BMEWS construction phase at Clear AFS. No visible surface expression of this landfill remains.

The following is a description of each landfill site identified at Clear AFS:

- Site No. 1 is located approximately 1,600 feet south of the construction camp. This site was used from 1959 to 1968 (see photographs in Appendix A). The site is closed and covered. During its operational history, all waste materials generated by the station were disposed of in the landfill. This included PCB-filled capacitors (approximately 300). Other materials which could have been disposed of in the landfill include asbestos insulation, waste oils, used solvents, electronic equipment/tubes, batteries, scrap metal, power line filters containing PCB, and domestic wastes.

  The operation of the landfill included continuous burning of materials contained. Those wastes which will not burn easily, such as PCB oil, asbestos, lead from batteries, etc., still have the potential to migrate into the ground-water system and off the installation.

- Site No. 2 is located approximately 3,000 feet southwest of the construction camp. This site was used from 1968 to 1975. During this period, all waste materials generated by the station were disposed of in the landfill. As with Site No. 1, this included PCB-filled capacitors (approximately 100), as well as other materials described above. Again, this landfill was kept burning. It is currently closed and covered.

- Site No. 3 is located approximately 1,800 feet south of the Tech Site (Tech Site refers to that area where radar generation and detection is accomplished--see Figure 9). This site has been in operation since 1975 (see photographs in Appendix A). As with Sites No. 1 and 2, this landfill received all wastes generated by the station. Capacitors were disposed of in the landfill until 1979, at which time they were shipped to Eilson AFB for disposal through DPDO. It is estimated that there are approximately 100 capacitors in this landfill. This landfill was also burned regularly during the first year of operation, after which burning ceased. Currently, the landfill is covered using fly ash from the power plant.

- Site No. 4 is located approximately 4,000 feet north of the composite area. This site was used prior to 1959 before BMEWS was in operation. This site was probably used when this station was used as a bombing range. This site is immediately upgradient and the closest site to the community of Anderson which gets its water supply from wells completed in the regional aquifer.

- Site No. 14 is located immediately south of the construction camp. This site was used as a disposal area for construction debris while the site was being built. The site was probably in use from 1959 to 1961.

There is no detailed documentation of the types of materials disposed of in the five landfills at Clear AFS. Since the site has only one basic function, radar generation, there has not been a great deal of industrial activity.

Therefore, the majority of the waste in the landfill is directly related to this function. It is fairly certain that PCB-filled items were placed in the landfill in moderately large quantities (over 500 capacitors). Also, small quantities of other hazardous materials were probably disposed of in the landfills including waste oil, paints, thinners, and solvents which were probably burned off, battery casings, asbestos insulation, electronic tubes, and empty pesticide containers. Some small amounts of weathered MOGAS and AVGAS sludge containing tetraethyl lead could also have been disposed of in landfills.

PCB contamination from past landfill operations is the most serious potential contamination problem at Clear AFS. Selected wells were sampled around Clear and in the nearby town of Anderson and tested for PCB contamination in 1979-80. No PCB contamination was reported; however, all wells sampled are located north of the landfills containing PCB, whereas the hydraulic gradient is to the east to northeast making these wells inappropriate sampling points to detect PCB contamination from past/current landfills at Clear AFS.

Potable water wells, five at the Tech Site, one at the construction camp, and five at Anderson were sampled. However, since the hydraulic gradient at Clear AFS is probably in an east to northeast direction, the results from this sampling effort would be inconclusive.

The past practice at all landfills was continuous burning. Currently fly ash from the power plant is used as cover.

2. Other Waste/Potentially Contaminated Areas

Six areas other than landfills were identified as disposal or potentially contaminated sites of hazardous materials. These include the following:

- Site No. 5 is located adjacent to and east of the power plant. Approximately 20,000 tons of coal is stockpiled in case of emergency.

- Site No. 6 is located approximately half-way between the construction camp and the composite area. This is the site of the Imhoff tank and leach field which handles the major portion of the wastewater generated by the station. Sludge from this system was likely disposed of in the landfills.

- Site No. 8 is located adjacent to and south of the power plant. This site is the location of two 25,000-gallon underground fuel storage tanks used to fuel standby generators. A 200-gallon fuel spill occurred and was cleaned up by use of absorbant material in April 1981.

- Site No. 10 is located in the east end of Building 250. This site is the radioactive materials storage and disposal (by burial) area. The material buried consisted of small electronic tubes having low level radioactivity.

- Site No. 11 is located in the northeast corner of the construction camp. This site was the fire training area where small quantities of waste oils were burned as training exercises (stopped in 1976).

- Site No. 15 is located approximately 3,400 feet northwest of the power plant. This site is called Lake Sansing and is the final step in the cooling water handling from both the Tech Site and the power plant (see photographs in Appendix A). Chemicals used for corrosion/scale control as well

as runoff from the site are discharged after neutralization to Lake Sansing. This lake is a man-made percolation pond lined with fly ash and topsoil to slow the natural, rapid percolation.

3. Spills and Other Contaminated Areas

Three areas where spills have occurred, primarily fuel and other possible contamination from partially filled drums, were identified:

- Site No. 7 is located adjacent to the utilidor between the power plant and Building 250. This was the site of a 50,000-gallon fuel spill which occurred in 1959-60. No clean-up or recovery was attempted at this site.

- Site No. 12 is located adjacent to and east of Site No. 1. Three or four partially filled drums were located here during ground tour (see photographs in Appendix A). There was some leakage observed.

- Site No. 13 is located adjacent to and west of Site No. 2. Station personnel located approximately four more partially filled drums here. There was some indication of leakage.

4. Areas Eliminated From Further Study

Two areas were observed during the site visit and were deemed to pose no immediate or past contamination potential and were eliminated from further consideration. These areas were not rated.

- Site No. 9 is located adjacent to and southeast of the composite area. This is the site of two 25,000-gallon underground MOGAS tanks. There was no observable evidence of fuel contamination.

- Site No. 16 is located inside the power plant. This site consists of at least three large (1,000 gallon) PCB-filled transformers currently in operation. The transformers overhang the grating covering the cooling water discharge system. This could be a problem if a leak were to develop in the transformers. This condition was pointed out to the station commander, and steps are being taken to eliminate this condition. There was no observable evidence of leakage.

# V. CONCLUSIONS

## V. CONCLUSIONS

A. No direct evidence was found to indicate that migration of contaminants beyond Clear AFS property boundaries has occured.

B. Evidence obtained through interviews with key station personnel indicates that hazardous wastes, primarily PCB-filled capacitors, have been disposed of in landfill operations in the past.

C. Current handling/disposal of PCB-filled transformers/ capacitors is safe, with the exception of those transformers in the power plant which overhang the cooling system grating.

D. Where hazardous materials have been disposed of, the potential exists for migration of pollutants beyond Clear AFS boundaries due to the following factors:

1. The existence of four past/current landfill sites at which it is known that PCB-filled items and other hazardous materials were disposed of in the past.

2. Permeable soil conditions with an absence of confining beds.

E. Table 5 provides a listing of the 14 sites identified as possible sources of contamination and the overall rating scores. The following sites were identified as areas showing the highest potential for contaminant migration and warrant additional study:

1. Sites No. 1, 2, and 3, due primarily to:

Table 5
PRIORITY LISTING OF SITES WHICH WERE RATED

SITES WARRANTING ADDITIONAL STUDY

| Site No. | Site Description | Overall Score |
|---|---|---|
| 3 | Current Landfill 1975-Present | 66 |
| 1 | Past Landfill 1969-1968 | 64 |
| 2 | Past Landfill 1968-1975 | 63 |
| 4 | Old Landfill Prior to 1959 | 48 |
| 12 | Partially Filled Drums | 47 |
| 15 | Lake Sansing Percolation Pond | 47 |
| 13 | Partially Filled Drums | 47 |

SITES NOT WARRANTING ADDITIONAL STUDY

| Site No. | Site Description | Overall Score |
|---|---|---|
| 7 | Fuel Spill | 47 |
| 10 | Radioactive Material Storage Area | 45 |
| 8 | Fuel Tanks | 42 |
| 14 | Construction Camp Disposal Area | 41 |
| 11 | Fire Training Area | 41 |
| 6 | Septic Tank Leach Field | 40 |
| 5 | Coal Storage Area | 39 |

Note: Sites No. 9 and 16 were not rated.

- Quantities of PCB and other hazardous materials disposed of.

- Permeability of soil.

2. Site No. 4, due primarily to:

   - Disposal of unknown types and quantities of materials.

   - Permeability of soil.

   - Proximity to populated area and associated water supply wells.

3. Site No. 12 and 13, due primarily to:

   - Characteristics of materials which may be contained.

   - Possibility of uncontrolled access.

   - Permeability of soil.

   - Observed leakage.

4. Site No. 15, due primarily to:

   - Characteristics of some chemicals discharged from the power plant.

   - Possibility of uncontrolled access and wildlife contact.

   - Permeability of soil.

F. Sites No. 5, 6, 7, 8, 10, 11, and 14 are not considered to pose a significant hazard for migration nor to pose a significant health hazard. Therefore, these sites do not warrant additional study.

G. Sites No. 9 and 16 were observed in the field and not considered hazardous waste sites and were eliminated from further study.

# VI. RECOMMENDATIONS

## VI. RECOMMENDATIONS

Although no direct evidence of hazardous contaminant migration was found during the Records Search, it is recommended that a limited program (Phase II) be implemented to verify if contaminant migration is or is not a problem at Clear AFS. This program should consist of construction and sampling of monitoring wells both up- and downgradient from the past/current landfills. In the landfill areas, soil column sampling should also be done. The limited program should also include sampling at Lake Sansing. Specific details of the recommended monitoring program for each site are listed below.

- Site No. 1; past landfill 1959-1968. This site received approximately 300 capacitors which is approximately 50 percent of all PCB-filled capacitors disposed of at Clear AFS. Assuming that the hydraulic gradient of the water table is away from the Nenana River, ground water flow is probably east to northeast. Four wells should be installed, one at each point of the compass, north, south, east, and west, around the landfill approximately 20 feet from the site perimeter. Wells should be 2 to 4 inches in diameter cased and screened, with the design of each based on the specific geologic conditions present. These wells should be approximately 100 feet deep with 25 feet of screen. The four monitoring wells should be surveyed into a common datum and the direction of ground-water flow determined. Once completed, two additional wells of the type described above should be installed, both downgradient, spaced at appropriate intervals as determined by site geology. These wells should also be referenced to the same datum as the first four wells. The hydraulic gradient should be reassessed using all six wells.

Water samples should be collected from the monitoring wells and analyzed for PCB, arsenic, heavy metals including chromium, hexavalent chromium, cadmium, lead, mercury, selenium, and silver, volatile organic compounds, total organic carbon, pH, phenols, solvents (particularly TCE and FO-352), and specific conductance.

Once hydraulic gradient has been established, soil samples should be collected at increments of 5 feet from ground surface to the top of the water table (approximately 75 feet) at one site immediately adjacent to the landfill on the downgradient side. Soil samples should be analyzed for PCB contamination by selecting one sample per 20 feet for analysis. If contamination is found, a more precise determination of the vertical location of the contamination could be found by analyzing soil samples taken at 5-foot intervals within the 20-foot interval first investigated.

- Site No. 2; past landfill 1968-1975. This site received approximately 100 capacitors, or approximately 20 percent of all PCB-filled capacitors disposed of at Clear AFS. The same monitoring well construction/sampling and soil sampling procedures described for Site No. 1 should be followed for Site No. 2. Two of the initial four wells may be eliminated if the hydraulic gradient can be assumed from Site No. 1.

- Site No. 3; current landfill in use since 1975. This site received approximately 100 capacitors, or approximately 20 percent of all PCB-filled capacitors disposed of at Clear AFS. Current practices do not allow disposal of such items in

the landfill; however, between 1975 and 1979 the site received PCB-filled capacitors.

The same monitoring well construction/sampling and soil sampling procedure described for Site No. 1 should be used here. Two of the initial four wells can be eliminated if the hydraulic gradient can be assumed from Sites No. 1 and 2.

- o Site No. 4; past landfill used prior to 1959. This site probably did not receive PCB material but was in use during the time when Clear AFS was used as a bombing range. This site is the closest disposal area to the community of Anderson and is located upgradient. One well should be installed adjacent to the landfill boundaries, between the landfill and the community of Anderson. Samples should be analyzed for heavy metals including chromium, hexavalent chromium, cadmium, lead, mercury, selenium and silver, volatile organic compounds, pH, phenols, and specific conductance.

- o Site No. 12; partially filled drums. This site was located during the station ground tour. Drums should be sampled and removed (currently being done). Soil samples should be collected in the immediate vicinity of the drums and analyzed for those chemicals found in the drums. Any further monitoring efforts would depend on the characteristics of material in the drums. A more detailed site survey should be conducted to locate, sample, and remove any other drums of this type.

- o Site No. 13; partially filled drums. After the partially filled drums were reported to the station commander, a search of the area identified another

site where drums were disposed of. The sample procedure described above for Site No. 12 should be followed here.

- Site No. 15; Lake Sansing. This man-made lake is a percolation pond for power plant and Tech Site cooling water. The pond originally percolated very rapidly due to the nature of the soil (very permeable). The bottom was lined with fly ash from the power plant coal burning operation in the late 1960's and topsoil to slow down percolation rates, thus creating the lake. The pond was lined in the late 1960's and was shortly thereafter stocked with game fish. Since the power plant used various chemicals in the operation, these chemicals are ultimately discharged to the lake, eventually percolating to the ground-water system. The lake water should be sampled periodically and analyzed for PCB, heavy metals including chromium, hexavalent chromium, cadmium, lead, mercury, selenium and silver, volatile organic compounds, total organic carbon, pH, and specific conductance. In addition, several mature fish from the pond should be caught and the tissue analyzed for PCB-contamination. Also, one bottom sediment sample should be collected and analyzed for the same parameters as the water sample.

In the event that contaminants are detected in samples collected from the wells, the lake, or from soil samples, a more extensive field survey should be implemented to determine the lateral/areal extent of contaminant migration. Details of the program outlined above, including the exact location of sampling points, should be finalized as part of the Phase II program.

REFERENCES

## REFERENCES

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4. Péwé, Troy, L., Clyde Wahrhaftig, and Florence Weber. "Geologic Map of the Fairbanks Quadrangle, Alaska," Department of the Interior, U.S.G.S., 1966.

5. "Report of Subsurface Conditions, Clear Vicinity Project," U.S. Army Corps of Engineers, April, 1959.

6. "Report on Water Well Tests, Heat and Power Plant, Clear AFS, Alaska," Foundations and Materials Branch, Contract No. DA-1333, April 4, 1960.

7. "Sewage Handling and Treatment, Clear AFS, Alaska," Feasibility Study, FS-9-67-II, 1967.

8. "Report of Test Pumping of 12-inch Fire Protection Well Contractors Camp Area, Clear, Alaska," Geology Section, U.S. Army District, Alaska, Contract DA-1159, 1958.

Appendix A
PHOTOGRAPHS CLEAR AFS

GN14649.D0

**FIGURE A-1.** Cooling water discharge to Lake Sansing, Clear AFS (Site No. 15).

**FIGURE A-2.** Old abandoned landfill used from 1959 to 1968, Clear AFS (Site No. 1).

**FIGURE A-3.** Current landfill, Clear AFS (Site No. 3).

**FIGURE A-4.** Abandoned drums filled with unknown liquid, Clear AFS (Site No. 12).

Appendix B
RESUMES OF KEY TEAM MEMBERS

■ **GARY E. EICHLER**
Hydrogeologist

### Education

M.S., Engineering Geology, University of Florida, 1974
B.S., Construction and Geology, Utica College of Syracuse University, 1972

### Experience

Mr. Eichler has been responsible for ground-water projects for both water supply and effluent disposal. Studies have included site selection, well design, construction services, monitoring and testing programs, determination of aquifer characteristics, and well field design. Examples of projects on which Mr. Eichler has worked include:

- Palm Coast, Florida. Conducted a test well program to determine available ground-water resources of a 250,000-person coastal development.

- Live Oak, Florida. Determination of geologic conditions at a pond failure site; identification of failure causes and recommendation for redesign of the facility compatible with site geology.

- Quaker Oats Company, Belle Glade, Florida. Test pumping and water quality sampling for an injection well facility; provided operational design criteria for the disposal system and determined aquifer characteristics.

- St. Augustine, Florida. Prepared a program of exploration and testing to locate a future supply of water; determined hydrogeologic conditions, located potential well sites, and initiated a test program.

Prior to joining CH2M HILL in 1976, Mr. Eichler was an engineering geologist with Environmental Science and Engineering, Inc., of Gainesville, Florida. Responsibilities there included project management, soils investigations, siting studies, ground-water and surface-water reports, and federal and state environmental impact studies. He has professional capabilities in the following areas.

- Hydrogeology. Water supply well location, aquifer testing, well field layout, injection well testing and monitoring program design, and well construction inspection.

- Water resources inventory. Potentiometric mapping, water yield, and availability determinations.

GARY E. EICHLER

- Site investigations. Determination of subsurface conditions, primarily in soil media. Determination of stratigraphic correlation and associated physical properties for engineering design.

- Environmental permitting. Federal, state, regional, and local permit studies associated with industrial and mining projects.

- Clay mineralogy. Clay mineral reactions primarily associated with lime stabilization for highways and other engineering projects. Participated in a Brazilian highway project and developed laboratory analysis for lime-soil reactions.

- Engineering geology. Geologic exploration, soil property determinations for engineering design, and water and earth materials interactions associated with construction.

- Geophysics. Well logging and interpretation.

Mr. Eichler directed the laboratory analysis of tropical soils to determine engineering properties and reaction potential with lime additives for a Brazilian highway project. He also assisted in the preparation and presentation of a seminar on lime stabilization sponsored by the National Lime Association.

**Membership in Organizations**

American Water Resources Association
Association of Engineering Geologists
Geological Society of America
Southeastern Geological Society

**Publications**

Engineering Properties and Lime Stabilization of Tropically Weathered Soils. M.S. thesis, Department of Geology, University of Florida. August 1974.

## BRIAN H. WINCHESTER
**Ecologist**

### Education

B.S., Wildlife Ecology, University of Florida, 1973

### Experience

Mr. Winchester's responsibilities at CH2M HILL include project management, design and implementation of field sampling programs, data analysis and interpretation, impact assessment and prediction, environmental planning for impact mitigation, report preparation and review, and technical consulting at client-agency hearings. He has applied his expertise to numerous Environmental Impact Statements (EIS's), Developments of Regional Impact (DRI), and industry, power plant, and 208 studies.

- Trident Submarine Base EIS—Managed terrestrial and wetland biology subproject. Designed and directed quarterly field sampling and analyses for coastal sites in Rhode Island, Virginia, South Carolina, Georgia, and Florida. Prepared terrestrial and wetland portions of draft and final EIS.

- Gulf Intracoastal Waterway EIS—Conducted flora/fauna assessment of biota along the 300-mile Intracoastal Waterway in coastal Louisiana. Assessed impacts of maintenance dredging.

- California Lake Watershed EIS—Inventoried and mapped biotic communities for a 9-square-mile watershed in Dixie County, Florida. Assessed impacts of flood control channelization of major watercourses.

- Phosphate Industry DRI's—Managed or assisted in preparing five phosphate mine DRI's in central Florida. Helped develop mining and reclamation plans and provided technical input at client/agency hearings. Also provided biological baseline and impact assessment data for beneficiation plant sitings.

- Residential Development DRI's—Conducted biotic community inventories, delineated wetlands, and prepared DRI's for three proposed residential developments in central and southern Florida.

- Wetlands Studies—Developed cost-effective, time-effective methodology for estimating the ecological value of freshwater wetlands and applied the technique to over 800 wetlands in central peninsular Florida. Assessed potential dredge and fill impacts on numerous wetlands.

- Transportation/Corridor Studies—Evaluated biological impacts associated with alternative routings of major new highways in Pinellas and Duval Counties, Florida. Assessed environmental impacts of upgrading a telephone communications corridor extending from Windermere to Tampa. Described biota and prepared a negative declaration for a proposed interstate highway interchange in Flagler County.

BRIAN H. WINCHESTER

- Power Plant Studies—Conducted study of aquatic biota entrained at a Miami generating station. Assessed impacts of blowdown on plant communities surrounding two Florida generating stations. Assisted in delineation of biotic communities for a generating station expansion in Crystal River, Florida. Prepared environmental assessments for siting power plants in western and northeastern Washington.

- Industry Studies—Managed a 2-year biological monitoring program to assess potential impacts of industrial effluents in upper Escambia Bay. Conducted baseline terrestrial and aquatic quarterly sampling for a clean fuels facility to be located adjacent to an estuarine area in Jacksonville, Florida. Predicted $SO_2$ and $NO_x$ air emission impacts on vegetation for a proposed caprolactam facility in southern Alabama. Contributed to preliminary biological inventories of limestone quarry and processing plantsites in central and coastal Alabama.

- 208 Studies—Mapped and assigned value classifications for all nonmarine wetlands in Pasco, Pinellas, Hillsborough, and Manatee Counties, Florida, for Tampa area 208.

- Rare and Endangered Biota Research—Managed and designed a research project on the ecology and management of a recently rediscovered endangered mammal. Conducted numerous endangered biota inventories.

Membership in Organizations

Ecological Society of America

Publications

"An Approach to Valuation of Florida Freshwater Wetlands." *Proceedings of the Sixth Annual Conference on the Restoration and Creation of Wetlands*, 1979 (with L. D. Harris).

The Current Status of the Colonial Pocket Gopher. *Oriole* 43:33-35. 1978 (with R. S. DeLotelle).

Ecology and Management of the Colonial Pocket Gopher: A Progress Report. *Proceedings of the Rare and Endangered Wildlife Symposium*, Athens, Georgia, 1978 (with R. S. DeLotelle, J. R. Newman, and J. T. McClave).

*The Ecological Effects of Arsenic Emitted from Nonferrous Smelters.* Final Report for U.S. EPA, Washington, D.C. (with Francis E. Benenati and Timothy P. King) February 1976.

## BARBARA J. BRITT
Engineering Technician

**Education**

Currently Enrolled in Pre-Engineering at Santa Fe Community College

**Experience**

Ms. Britt has been with the firm since 1973. Her primary responsibilities involve data reduction and report preparation for ground-water monitoring, injection well monitoring, well field design, and testing program projects.

Examples of her project-related experience include:

- Assisted in the development and implementation of a hazardous waste monitoring program for GATX, Waycross, Georgia.
- Collection and analysis of aquifer test data for the City of St. Augustine, Florida.
- Data technician for the City of St. Petersburg, Florida, Injection Test Well Program.
- Assisted in the testing and drilling of production wells for Palm Coast, Florida.
- Well log reductions and interpretation for Miami-Dade Water and Sewer Authority Injection Well Construction Program.

Ms. Britt is also trained to operate geophysical well logging equipment for use in interpretation of characteristics in rocks, subsurface fluids, and construction of wells.

Appendix C
OUTSIDE AGENCY CONTACT LIST

## Appendix C
## AGENCY CONTACTS

1. Alascom, Fairbanks, Alaska 99701, Dwayne Taylor, 211/Zenith-9000

2. University of Alaska, Geophysical Institute, College Road, Fairbanks, Alaska 99701, Richard Reger, 907/479-7496

3. University of Alaska, Cold Regions Research Engineering Lab, Fairbanks, Alaska 99701, Larry Johnson, 907/479-7637

4. Department of Interior, National Petroleum Reserve, 2525 C Street, Anchorage, Alaska 99501, Lou Jers, 907/271-3632

5. Department of Fish and Game, College Road, Fairbanks, Alaska 99701, Mel Bucholtz, 907/452-1531

6. U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501, Max Brewer, 907/276-4566

7. EPA, Alaska Operations Office, 701 C Street, Anchorage, Alaska 99501, Bill La Mororeaux, 907/271-5083

8. Department of Environmental Conservation, Juneau, Alaska 99801, Al Boggs, 907/465-2666

9. U.S. Fish and Wildlife Service, 1101 East Tudor Road, Anchorage, Alaska 99501, Howard Metsker, 907/263-3510

Appendix D
SITE HAZARD EVALUATION METHODOLOGY

HQ AIR FORCE ENGINEERING AND SERVICES CENTER
AND
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY

# SITE RATING METHODOLOGY

# FOR

# PHASE I
# INSTALLATION RESTORATION PROGRAM

July 1981

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site ____________________

Location ____________________

Owner/Operator ____________________

Comments ____________________

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| **RECEPTORS** | | | | |
| Population Within 1,000 Feet | | 4 | | |
| Distance to Nearest Drinking Water Well | | 15 | | |
| Distance to Reservation Boundary | | 6 | | |
| Land Use/Zoning | | 3 | | |
| Critical Environments | | 12 | | |
| Water Quality of Nearby Surface Water Body | | 6 | | |

Number of Assumed Values = _____ Out of 6

Percentage of Assumed Values = _____ %

Number of Missing Values = ____ Out of 6

Percentage of Missing Values = ____ %

SUBTOTALS ________ ________

SUBSCORE ________

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| **PATHWAYS** | | | | |
| Evidence of Water Contamination | | 10 | | |
| Level of Water Contamination | | 15 | | |
| Type of Contamination, Soil/Biota | | 5 | | |
| Distance to Nearest Surface Water | | 4 | | |
| Depth to Groundwater | | 7 | | |
| Net Precipitation | | 6 | | |
| Soil Permeability | | 6 | | |
| Bedrock Permeability | | 4 | | |
| Depth to Bedrock | | 4 | | |
| Surface Erosion | | 4 | | |

Number of Assumed Values = ____ Out of 10

Percentage of Assumed Values = ____ %

Number of Missing Values = ____ Out of 10

Percentage of Missing Values = ____ %

SUBTOTALS ________ ________

SUBSCORE ________

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE ______

Reason for Assigned Hazardous Rating:

______

______

______

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 7 | | |
| Hazardous Waste Quantity | | 7 | | |
| Total Waste Quantity | | 4 | | |
| Waste Incompatibility | | 3 | | |
| Absence of Liners or Confining Beds | | 6 | | |
| Use of Leachate Collection System | | 6 | | |
| Use of Gas Collection Systems | | 2 | | |
| Site Closure | | 8 | | |
| Subsurface Flows | | 7 | | |

Number of Assumed Values = ____ Out of 9

Percentage of Assumed Values = ____%

Number of Missing and Non-Applicable Values = ____ Out of 9

Percentage of Missing and Non-Applicalbe Values = ____%

SUBTOTALS ______ ______

SUBSCORE ______

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25

Overall Percentage of Assumed Values = ____%

OVERALL SCORE ______

(Receptors Subscore X 0.22 plus
Pathways Subscore X 0.30 plus
Waste Characteristics Subscore X 0.24 plus
Waste Management Subscore X 0.24)

SITE RATING METHODOLOGY

FOR

PHASE I INSTALLATION RESTORATION PROGRAM

1. This site rating methodology for Phase I of the Installation Restoration Program (IRP) has been jointly developed by $CH_2M$ Hill and Engineering-Science based on experience in performing Record Searches at several Air Force installations. This standard site rating system should be used for all Air Force IRP Records Search efforts to assist in Air Force prioritization and commitment of resources for Phase II survey actions.

2. The basis for the rating system is the document developed by JRB Associates, Inc. for the EPA Hazardous Waste Enforcement office. The JRB system was modified to accurately address specific Air Force installation conditions and to provide meaningful comparison of landfills and contaminated areas other than landfills.

3. Questions pertaining to use of the Air Force Site Rating Methodology should be addressed to either Mr. Lindenberg, AFESC/DEVP, AUTOVON 970-6189 (Commercial (904) 283-6189) or Major Fishburn, AF OEHL/EC, AUTOVON 240-3305 (Commercial (512) 536-3305).

Note: Both $CH_2M$ Hill and Engineering-Science are Engineering Support contractors for the US Air Force.

## RATING FACTOR SYSTEM GUIDELINES

### RECEPTORS

| Rating Factors | Rating Scale Levels: 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Population within 1,000 Feet | 0 | 1 to 25 | 26 to 100 | Greater than 100 |
| Distance to Nearest Drinking Water Well | Greater than 3 miles | 1 to 3 miles | 3,001 feet to 1 mile | 0 to 3,000 feet |
| Distance to Reservation Boundary | Greater than 2 miles | 1 to 2 miles | 1,001 feet to 1 mile | 0 to 1,000 feet |
| Land Use/Zoning | Completely remote (zoning not applicable) | Agricultural | Commercial or industrial | Residential |
| Critical Environments | Not a critical environment | Pristine natural areas | Wetlands; flood plains, and preserved areas; presence of economically important natural resources | Major habitat of an endangered or threatened species; presence of recharge area |
| Water Quality Designation of Nearest Surface-Water Body | Agricultural or industrial use | Recreation, propagation and management of fish and wildlife | Shellfish propagation and harvesting | Potable water supplies |
| | **PATHWAYS** | | | |
| Evidence of Water Contamination | No contamination | Indirect evidence | Positive proof from direct observation | Positive proof from laboratory analyses |
| Level of Water Contamination | No contamination | Low levels, trace levels, or levels less than maximum contaminant level (MCL) or EPA drinking water standards | Moderate levels or levels near MCL or EPA drinking water standards | High levels greater than MCL or EPA drinking water standards |
| Type of Contamination Soil/Biota | No contamination | Suspected contamination | Moderate contamination | Severe contamination |
| Distance to Nearest Surface Water | Greater than 1 mile | 2,001 feet to 1 mile | 501 feet to 2,000 feet | 0 to 500 feet |
| Depth to Ground Water | Greater than 500 feet | 51 to 500 feet | 11 to 50 feet | 0 to 10 feet |
| Net Precipitation | Less than −10 inches | −10 to +5 inches | +5 to +20 inches | Greater than +20 inches |
| Soil Permeability | Greater than 50% clay ($<10^{-6}$ cm/s) | 30% to 50% clay ($10^{-4}$ to $10^{-6}$ cm/s) | 15% to 30% clay ($10^{-2}$ to $10^{-4}$ cm/s) | 0% to 15% clay ($>10^{-2}$ cm/s) |
| Bedrock Permeability | Impermeable ($<10^{-6}$ cm/s) | Relatively impermeable ($10^{-4}$ to $10^{-6}$ cm/s) | Relatively impermeable ($10^{-2}$ to $10^{-4}$ cm/s) | Very permeable ($>10^{-2}$ cm/s) |
| Depth to Bedrock | Greater than 60 feet | 31 to 60 feet | 11 to 30 feet | 0 to 10 feet |
| Surface Erosion | None | Slight | Moderate | Severe |

## WASTE CHARACTERISTICS

Judgemental hazardous rating from 30 to 100 points based on the following guidelines:

| Points | Condition |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantities of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

## WASTE MANAGEMENT PRACTICES

| Rating Factors | Rating Scale Levels | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| Record Accuracy and Ease of Access to Site | Accurate records, no unauthorized dumping | Accurate records, no barriers | Incomplete records, no barriers | No records, no barriers |
| Hazardous Waste Quantity | <1 ton | 1 to 5 tons | 5 to 20 tons | >20 tons |
| Total Waste Quantity | 0 to 10 acre feet | 11 to 100 acre feet | 101 to 250 acre feet | Greater than 250 acre feet |
| Waste Incompatibility | No incompatible wastes are present | Present, but does not pose a hazard | Present and may pose a future hazard | Present and posing an immediate hazard |
| Absence of Liners or Confining Strata | Liner and confining strata | Liner or confining strata | Low quality liner or low permeability strata | No liner, no confining strata |
| Use of Leachate Collection Systems | Adequate collection and treatment | Inadequate collection or treatment | Inadequate collection and treatment | No collection or treatment |
| Use of Gas Collection Systems | Adequate collection and treatment | Collection and controlled flaring | Venting or inadequate treatment | No collection or treatment |
| Site Closure | Impermeable cover | Low permeability cover | Permeable cover | Abandoned site, no cover |
| Subsurface Flows | Bottom of landfill greater than 5 feet above high ground-water level | Bottom of landfill occasionally submerged | Bottom of fill frequently submerged | Bottom of fill located below mean ground-water level |

JRB RATING SYSTEM
INTRODUCTION AND METHODOLOGY

Source: "Methodology for Rating the Hazard Potential of Waste Disposal Sites" JRB Associates, Inc., December 15, 1980

Note: This is an excerpt from the above-referenced document. For more detailed information refer to that source.

# CHAPTER 1.0 INTRODUCTION

As part of EPA's nationwide waste management program, land disposal facilities containing hazardous wastes will be investigated and evaluated. Remedial action plans will be formulated for those sites presenting a significant hazard. Because resources for this task are limited, the initial focus of the work must be on the most hazardous sites. Under the auspices of EPA's Office of Enforcement, JRB Associates has devised a methodology for selecting sites for investigation based on their high potential for environmental impact.

This methodology has several advantages over other rating systems:

- It is easy to use
- It does not require users to have an extensive technical background
- It uses readily available information
- It does not require complex chemical or hydrological analyses
- It does not require users to visit the facilities in question
- It allows sites to be rated even if some data needs cannot be met.

The system consists of 31 rating factors that are divided into 4 categories: receptors; pathways; waste characteristics; and waste management practices. Factors in the receptors category determine the prime targets of environmental contamination. Factors in the pathways category assess mecha nisms for contaminant migration. Factors in the waste characteristics category examine the types of hazards posed by contaminants in the site. Factors in the waste management practices category evaluate the quality of the facility's design and operation. Each rating factor has an associated four-level scale. Because all of these factors are not of equal importance, each also has been assigned a weighing factor, called a multiplier. Raters must simply decide

which level of the rating factor's scale is most appropriate for a given site and multiply the numeric value of that level by the corresponding multiplier. The sum of the products for the 31 factors divided by the maximum possible score and multiplied by 100 is the site's rating. The ratings are on a scale of 0 to 100 and can be interpreted in relative or absolute terms.

Users can assign additional points when the rating factors do not adequately address all of the problems of a site. However, only a limited number of additional points can be assigned. This arrangement helps to ensure that a site's rating is both complete and objective.

The methodology has been designed primarily for landfills, surface impoundments, and other types of land-based storage and disposal facilities. Incinerators and waste treatment facilities, however, are beyond scope with the exception of the solid wastes produced by them.

Site ratings should be performed as part of an overall investigation procedure. Prior to a site visit, ratings can be based on published materials, public and private records, and contacts with knowledgable parties. The results of this type of rating can be used to determine which sites present the greatest potential hazard and should be visited first. A final rating can be obtained with information obtained from a visit to a site. This rating can be used as a tool to help determine how limited resources should be spent for additional sampling, which may be required to fill data gaps, and for preparing remedial action plans and/or enforcement cases for sites that represent particularly severe hazards.

The methodology's validity has been tested at sites across the country. This testing includes comparing ratings completed for the same facilities both by different raters, and before and after site visits. Officials of New Jersey's Department of Environmental Protection agreed that the ratings on 30 sites in their state were good reflections of the true hazard potential of those sites. These results show that the methodology is an exceptionally useful and efficient tool for classifying and ranking the hazard potential of land disposal facilities.

The methodology is discussed in more detail in the following four chapters. Chapter 2 describes the six basic components of the methodology. Chapter 3 identifies sources of information for the system and describes how to resolve data gaps. Chapter 4 presents the step-by-step procedure for rating sites, and Chapter 5 discusses how site ratings can be used. The three appendices provide guidance for rating sites. Finally, the glossary located at the end of this document defines all terms related to the methodology.

## CHAPTER 2.0 DESCRIPTION OF THE METHODOLOGY

The site rating methodology has been developed in terms of six elements. These are:

- Factor categories
- Rating factors
- Rating scales
- Multipliers
- Additional points
- Hazard potential scores.

These elements are described below.

### 2.1 FACTOR CATEGORIES

In assessing the environmental impacts of any hazardous waste disposal site, four considerations must be addressed. These are:

- Receptors
- Pathways
- Waste characteristics
- Waste management practices.

Receptors refer to the biota (human and non-human) which are potentially affected by the materials released from a waste disposal site. Within this category, special attention is given to human populations and critical environments. Pathways refer to aspects of the routes by which hazardous materials can escape from a given site. The focus of this cateory is on the ease of migration of water soluble pollutants and on contamination due to the site. Waste characteristics refer to the types of hazards posed by materials in the facility in terms of both their health-related effects and their environmental mobility. Waste management practices refer to the design characteristics and management practices of a given disposal site as they

relate to the site's environmental impact. In particular, this category examines measures that are being taken to minimize exposure to hazardous wastes.

The prime importance of the factor categories is in partitioning the rating factors into manageable groups so that site ratings can be more easily and completely interpreted. This topic is discussed in greater detail in Chapter 5.

## 2.2 RATING FACTORS

The initial rating of a waste disposal facility is based on a set of 31 rating factors. Each of these has been assigned to one of the four factor categories. The receptors catgegory has five rating factors:

- "Residential population within 1,000 feet" and "Distance to the nearest off-site building" measure the potential for human exposure to the site
- "Distance to the nearest drinking-water well" measures the potential for human ingestion of contaminants should underlying aquifers be polluted
- "Land use/zoning" evaluates the current and anticipated uses of the surrounding area
- "Critical environments" assesses the potential for adversely affecting important biological resources and fragile natural settings.

The pathways category contains nine rating factors concerned with the potential migration and attenuation of contaminants. The primary focus is on waterborne pollutants, since they can affect the greatest number of people.

- "Distance to the nearest surface water" and "Depth to groundwater" measure the availability of pollutant migration routes
- "Soil permeability," "bedrock permeability," and "depth to bedrock" measure the potential for contaminant attenuation and ease of migration

- "Net precipitation" uses annual precipitation and evapotranspiration to estimate the amount of leachate a site produces

- "Evidence of contamination," "type of contamination," and "level of contamination" evaluate pollution currently apparent at the site.

The waste characteristics category contains rating factors which examine the waste's environmental mobility and the adverse effects it can cause.

- "Solubility," "volatility," and "physical state" measure the extent to which mobile wastes can leave the site

- "Toxicity," "radioactivity," and "persistence" assess the site's potential to cause health-related injuries

- "Ignitability," "reactivity," and "corrosiveness" evaluate the possibility of fire, explosion, or similar emergencies.

The waste management practices factor category evaluates site design and operation. This category includes eight rating factors:

- "Use of leachate collection systems," "use of gas collection systems," and "use of liners" examine features of site design for containing contamination

- "Site security" assesses the measures taken to limit site access

- "Total waste quantity" and "hazardous waste quantity" measure the quantity of waste in the site, and thus, the potential magnitude of resulting contamination

- "Waste incompatibility" evaluates the potential for incompatible wastes to combine and pose a hazard

- "Use of containers" assesses the adequacy of using containers to isolate wastes.

These factors have been selected because they are relevant to an evaluation of any land-based disposal facility. The definition and purpose of each rating factor appear in Appendix A.

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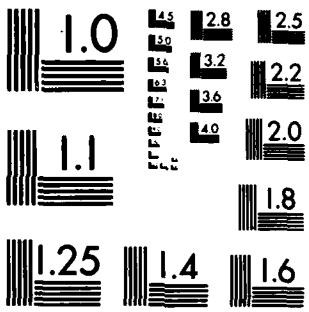
1.0
2.8
2.5
3.2
2.2
3.6
4.0
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1.8
1.25
1.4
1.6

## 2.3 RATING SCALES

For each of the factors, a four-level rating scale has been developed which provides factor-specific levels ranging from "0" (indicating no potential hazard) to "3" (indicating a high potential hazard). The rating factors and their corresponding rating scales for each of the factor categories are listed in Table 1. These scales have been defined so that the rating factors typically can be evaluated on the basis of readily available information from published materials, public and private records, contacts with knowledgeable parties, or site visits. Raters compare the information collected for a site with the limits set in the scales, and see which level of each scale most closely fits the information. The numeric value of that level is the factor rating for that factor. This process is described in more detail in Chapter 4. Additional guidance for assessing the rating scales appears in Appendix A.

## 2.4 MULTIPLIERS

The rating factors do not all assess the same magnitude of potential environmental impact. Consequently, a numerical value called a multiplier has been assigned to each factor in accordance with the relative magnitude of impact that it does assess. These values are multiplied, hence the term multiplier, by the appropriate factor ratings (see Section 2.3) to result in factor scores for each of the rating factors. The 31 multipliers appear as the third column from the right on the methodology's two-page Rating Form (see Figure 3).

## 2.5 ADDITIONAL POINTS

Special features of a facility's location, design, or operation are frequently encountered that cannot be handled satisfactorily by rating factors alone. These features might present hazards that are unusually serious, unique to the site, or not assessable by rating scales. For example, an extremely high population density near a site should be considered even more hazardous than the rating factor for "population within 1,000 feet" indicates.

Power lines running through sites containing explosive or flammable wastes, though not generally typical of waste disposal sites, should be considered a potential hazard. Finally, the function of the nearest off-site building might indicate a serious threat of human exposure exists, even though types of functions cannot be quantitatively evaluated by rating scales the way distance can be. In such cases, raters should assign a greater hazard potential score to a site than it might otherwise receive by using the additional points system. To guide raters as to the types of situations that might warrant additional points, several examples have been identified for each of the factor categories. These are:

RECEPTORS

- Use of site by local residents
- Neighboring land use
- Neighboring transportation routes, drinking water supplies, and important natural resources.

PATHWAYS

- Extreme runoff and erosion problems
- Slope instability
- Flooding
- Seismic activity.

WASTE CHARACTERISTICS

- Carcinogenicity, mutagenicity, and teratogenicity
- Infectiousness
- Low biodegradability
- High-level radioactivity.

WASTE MANAGEMENT PRACTICES

- Excessively large waste quantities
- Open burning of wastes
- Site abandonment
- Unsafe disposal practices
- Inadequate cover
- Inadequate safety precautions
- Inadequate recordkeeping.

Table 1. Rating Factors and Scales for Each of the Four Factor Categories (Continued)

| RATING FACTORS | RATING SCALE LEVELS | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 3 |
| | | RECEPTORS | | |
| POPULATION WITHIN 1,000 FEET | 0 | 1 TO 25 | 26 TO 100 | GREATER THAN 100 |
| DISTANCE TO NEAREST DRINKING-WATER WELL | GREATER THAN 3 MILES | 1 TO 3 MILES | 3,001 FEET TO 1 MILE | 0 TO 3,000 FEET |
| DISTANCE TO NEAREST OFF-SITE BUILDING | GREATER THAN 2 MILES | 1 TO 2 MILES | 1,001 FEET TO 1 MILE | 0 TO 1,000 FEET |
| LAND USE/ZONING | COMPLETELY REMOTE (ZONING NOT APPLICABLE) | AGRICULTURAL | COMMERCIAL OR INDUSTRIAL | RESIDENTIAL |
| CRITICAL ENVIRONMENTS | NOT A CRITICAL ENVIRONMENT | PRISTINE NATURAL AREAS | WETLANDS, FLOODPLAINS, AND PRESERVED AREAS | MAJOR HABITAT OF AN ENDANGERED OR THREATENED SPECIES |
| | | PATHWAYS | | |
| EVIDENCE OF CONTAMINATION | NO CONTAMINATION | INDIRECT EVIDENCE | POSITIVE PROOF FROM DIRECT OBSERVATION | POSITIVE PROOF FROM LABORATORY ANALYSES |
| LEVEL OF CONTAMINATION | NO CONTAMINATION | LOW LEVELS, TRACE LEVELS, OR UNKNOWN LEVELS | MODERATE LEVELS OR LEVELS THAT CANNOT BE SENSED DURING A SITE VISIT BUT WHICH CAN BE CONFIRMED BY A LABORATORY ANALYSIS | HIGH LEVELS OR LEVELS THAT CAN BE SENSED EASILY BY INVESTIGATORS DURING A SITE VISIT |
| TYPE OF CONTAMINATION | NO CONTAMINATION | SOIL CONTAMINATION ONLY | BIOTA CONTAMINATION | AIR, WATER, OR FOODSTUFF CONTAMINATION |
| DISTANCE TO NEAREST SURFACE WATER | GREATER THAN 5 MILES | 1 TO 5 MILES | 1,001 FEET TO 1 MILE | 0 TO 1,000 FEET |
| DEPTH TO GROUNDWATER | GREATER THAN 100 FEET | 51 TO 100 FEET | 21 TO 50 FEET | 0 TO 20 FEET |
| NET PRECIPITATION | LESS THAN -10 INCHES | -10 TO +5 INCHES | +5 TO +20 INCHES | GREATER THAN +20 INCHES |
| SOIL PERMEABILITY | GREATER THAN 50% CLAY | 30% TO 50% CLAY | 15% TO 30% CLAY | 0 TO 15% CLAY |
| BEDROCK PERMEABILITY | IMPERMEABLE | RELATIVELY IMPERMEABLE | RELATIVELY PERMEABLE | VERY PERMEABLE |
| DEPTH TO BEDROCK | GREATER THAN 60 FEET | 31 TO 60 FEET | 11 TO 30 FEET | 0 TO 10 FEET |

Table 1

RATING FACTORS AND SCALES FOR EACH OF THE FOUR FACTOR CATEGORIES

| RATING FACTORS | RATING SCALE LEVELS 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| **WASTE CHARACTERISTICS** | | | | |
| TOXICITY | SAX'S LEVEL 0 OR NFPA'S LEVEL 0 | SAX'S LEVEL 1 OR NFPA'S LEVEL 1 | SAX'S LEVEL 2 OR NFPA'S LEVEL 2 | SAX'S LEVEL 3 OR NFPA'S LEVELS 3 OR 4 |
| RADIOACTIVITY | AT OR BELOW BACK-GROUND LEVELS | 1 TO 3 TIMES BACK-GROUND LEVELS | 3 TO 5 TIMES BACK-GROUND LEVELS | OVER 5 TIMES BACK-GROUND LEVELS |
| PERSISTENCE | EASILY BIODEGRAD-ABLE COMPOUNDS | STRAIGHT CHAIN HYDROCARBONS | SUBSTITUTED AND OTHER RING COM-POUNDS | METALS, POLYCYCLIC COMPOUNDS, AND HALOGENATED HYDROCARBONS |
| IGNITABILITY | FLASH POINT GREATER THAN 200° OR NFPA'S LEVEL 0 | FLASH POINT OF 140°F. to 200°F. OR NFPA'S LEVEL 1 | FLASH POINT OF 80°F. TO 140°F. OR NFPA'S LEVEL 2 | FLASH POINT LESS THAN 80°F. OR NFPA'S LEVELS 3 OR 4 |
| REACTIVITY | NFPA'S LEVEL 0 | NFPA'S LEVEL 1 | NFPA'S LEVEL 2 | NFPA'S LEVELS 3 OR 4 |
| CORROSIVENESS | pH OF 6 TO 9 | pH OF 5 TO 6 OR 9 TO 10 | pH OF 3 TO 5 OR 10 TO 12 | pH OF 1 TO 3 OR 12 TO 14 |
| SOLUBILITY | INSOLUBLE | SLIGHTLY SOLUBLE | SOLUBLE | VERY SOLUBLE |
| VOLATILITY | VAPOR PRESSURE LESS THAN 0.1 mm Hg | VAPOR PRESSURE OF 0.1 TO 25 mm Hg | VAPOR PRESSURE OF 78 TO 25 mm Hg | VAPOR PRESSURE GREATER THAN 78 mm Hg |
| PHYSICAL STATE | SOLID | SLUDGE | LIQUID | GAS |
| **WASTE MANAGEMENT PRACTICES** | | | | |
| SITE SECURITY | SECURE FENCE WITH LOCK | SECURITY GUARD BUT NO FENCE | REMOTE LOCATION OR BREACHABLE FENCE | NO BARRIERS |
| HAZARDOUS WASTE QUANTITY | 0 TO 250 TONS | 251 TO 1,000 TONS | 1,001 TO 2000 TONS | GREATER THAN 2,000 TONS |
| TOTAL WASTE QUANTITY | 0 TO 10 ACRE FEET | 11 TO 100 ACRE FEET | 101 TO 250 ACRE FEET | GREATER THAN 250 ACRE FEET |
| WASTE INCOMPATIBILITY | NO INCOMPATIBLE WASTES ARE PRESENT | PRESENT, BUT DOES NOT POSE A HAZARD | PRESENT AND MAY POSE A FUTURE HAZARD | PRESENT AND POSING AN IMMEDIATE HAZARD |
| USE OF LINERS | CLAY OR OTHER LINER RESISTENT TO ORGANIC COMPOUNDS | SYNTHETIC OR CON CRETE LINER | ASPHALT BASE LINER | NO LINER USED |
| USE OF LEACHATE COLLECTION SYSTEMS | ADEQUATE COLLEC TION AND TREATMENT | INADEQUATE COLLEC TION OR TREATMENT | INADEQUATE COLLEC TION AND TREATMENT | NO COLLECTION OR TREATMENT |
| USE OF GAS COLLECTION SYSTEMS | ADEQUATE COLLEC TION AND TREATMENT | COLLECTION AND CONTROLLED FLARING | VENTING OR INADE-QUATE TREATMENT | NO COLLECTION OR TREATMENT |
| USE AND CONDITION OF CONTAINERS | CONTAINERS ARE USED AND APPEAR TO BE IN GOOD CONDITION | CONTAINERS ARE USED BUT A FEW ARE LEAKING | CONTAINERS ARE USED BUT MANY ARE LEAKING | NO CONTAINERS ARE USED |

While this list is by no means exhaustive, and other examples may be encountered by raters using the methodology, it does include the more commonly occurring situations. Appendix B provides guidance on the number of additional points that should be assigned for these situations.

In order to maintain the objectivity of the rating methodology while allowing the assignment of additional points, the following limits are placed on the number of additional points that may be assigned in each factor category:

- Receptors 50 points
- Pathways 25 points
- Waste characteristics 20 points
- Waste management practices 30 points.

The number of additional points allowed in each factor category is a function of the total available rating factor points and the relative importance of the category.

The actual procedure for assigning additional points is outlined in Chapter 4.

## 2.6 HAZARD POTENTIAL SCORES

The result of a site rating is a set of five hazard potential scores. These scores are:

- Overall score
- Receptors subscore
- Pathways subscore
- Waste characteristics subscore
- Waste management practices subscore.

The overall score is based on all the rating factors and additional points that are used to rate a site. Each subscore is based on those rating factors

and additional points in that factor category which are used to rate a site. All of these scores are normalized so that they are on a scale of 0 to 100. The normalization procedure is described in Chapter 4. Associated with every hazard potential score is a percentage of missing and assumed data. These percentages flag scores that are based on large amounts of missing data and, generally, measure the reliability of the scores. Chapter 5 describes how to interpret these scores.

## Appendix E
## SITE ASSESSMENT AND RATING FORMS

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 1 -- Landfill 1959-1968

Location: Southwest Clear AFS

Owner/Operator: Clear AFS

Comments: Site is a known dump for PCB capacitors.

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | | 2 | 15 | 30 | 45 |
| Distance to Reservation Boundary | | 1 | 6 | 6 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 78 | 138 |
| | | | SUBSCORE | | 56 |

Number of Assumed Values = 1 out of 6
Percentage of Assumed Values = 17 %
Number of Missing Values = 0 out of 6
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 63 | 195 |
| | | | SUBSCORE | | 32 |

Number of Assumed Values = 5 out of 10
Percentage of Assumed Values = 50 %
Number of Missing Values = 0 out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 100

Reason for Assigned Hazardous Rating:
Know dump for PCB capocitors

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | 2 | 7 | 14 | 21 |
| Total Waste Quantity | 3 | 4 | 12 | 12 |
| Waste Incompatibility | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | 3 | 6 | 18 | 18 |
| Use of Gas Collection Systems | 3 | 2 | 6 | 6 |
| Site Closure | 2 | 8 | 16 | 24 |
| Subsurface Flows | 0 | 7 | 0 | 21 |
| | | SUBTOTALS | 111 | 150 |
| | | SUBSCORE | | 74 |

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 6 Out of 25
Overall Percentage of Assumed Values = 24 %

OVERALL SCORE 64

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 2 -- Landfill 1968-1975

Location: Southwest Clear AFS

Owner/Operator: Clear AFS

Comments: Known dump for PCB capacitors

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| **RECEPTORS** | | | | |
| Population Within 1,000 Feet | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | 2 | 15 | 30 | 45 |
| Distance to Reservation Boundary | 1 | 6 | 6 | 18 |
| Land Use/Zoning | 0 | 3 | 0 | 9 |
| Critical Environments | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body Assumed | 1 | 6 | 6 | 18 |

Number of Assumed Values = 1 out of 6

Percentage of Assumed Values = 17 %

Number of Missing Values = 0 out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 78 138

SUBSCORE 56

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| **PATHWAYS** | | | | |
| Evidence of Water Contamination Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | 0 | 4 | 0 | 12 |
| Depth to Groundwater | 1 | 7 | 7 | 21 |
| Net Precipitation | 1 | 6 | 6 | 18 |
| Soil Permeability Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | 0 | 4 | 0 | 12 |
| Surface Erosion | 1 | 4 | 4 | 12 |

Number of Assumed Values = 5 out of 10

Percentage of Assumed Values = 50 %

Number of Missing Values = 0 out of 10

Percentage of Missing Values = 0 %

SUBTOTALS 63 195

SUBSCORE 32

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 100

Reason for Assigned Hazardous Rating: Known dump PCB capacitors

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | 1 | 7 | 7 | 21 |
| Total Waste Quantity | 3 | 4 | 12 | 12 |
| Waste Incompatibility | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | 3 | 6 | 18 | 18 |
| Use of Gas Collection Systems | 3 | 2 | 6 | 6 |
| Site Closure | 2 | 8 | 16 | 24 |
| Subsurface Flows | 0 | 7 | 0 | 21 |
| | | SUBTOTALS | 104 | 150 |
| | | SUBSCORE | | 69 |

(Factor Score Divided by Maximum Score and Multiplied by 100)

Number of Assumed Values = 0 Out of 9

Percentage of Assumed Values = 0 %

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicalbe Values = 0 %

Overall Number of Assumed Values = 6 Out of 25

Overall Percentage of Assumed Values = 24 %

**OVERALL SCORE** 62

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 3 -- Landfill 1975-present

Location: Southwest Clear AFS

Owner/Operator: Clear AFS

Comments: Known dump for PCB capacitors

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 1 | 6 | 6 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 93 | 138 |
| | | | SUBSCORE | | 67 |

Number of Assumed Values = 1 out of 6
Percentage of Assumed Values = 17%
Number of Missing Values = 0 out of 6
Percentage of Missing Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 63 | 195 |
| | | | SUBSCORE | | 32 |

Number of Assumed Values = 5 out of 10
Percentage of Assumed Values = 50%
Number of Missing Values = 0 out of 10
Percentage of Missing Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 100

Reason for Assigned Hazardous Rating: Known dump of PCB capacitors

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | 1 | 7 | 7 | 21 |
| Total Waste Quantity | 3 | 4 | 12 | 12 |
| Waste Incompatibility | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | 3 | 6 | 18 | 18 |
| Use of Gas Collection Systems | 3 | 2 | 6 | 6 |
| Site Closure | 2 | 8 | 16 | 24 |
| Subsurface Flows | 0 | 7 | 0 | 21 |
| | | SUBTOTALS | 104 | 150 |
| | | SUBSCORE | | 69 |

(Factor Score Divided by Maximum Score and Multiplied by 100)

Number of Assumed Values = 0 Out of 9
Percentage of Assumed Values = 0 %
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0 %

Overall Number of Assumed Values = 6 Out of 25
Overall Percentage of Assumed Values = 24 %

**OVERALL SCORE** 65

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 4 -- Landfill Used Prior to 1959
Location: New Rifle Range    Clear AFS
Owner/Operator: Clear AFS
Comments: Used when the station was a bombing range. May contain unexploded ordinances

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| **RECEPTORS** | | | | |
| Population Within 1,000 Feet | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | 2 | 15 | 30 | 45 |
| Distance to Reservation Boundary | 0 | 6 | 0 | 18 |
| Land Use/Zoning | 0 | 3 | 0 | 9 |
| Critical Environments | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body — Assumed | 1 | 6 | 6 | 18 |
| | | SUBTOTALS | 72 | 138 |
| | | SUBSCORE | | 52 |

Number of Assumed Values = 1 out of 6
Percentage of Assumed Values = 17%
Number of Missing Values = 0 out of 6
Percentage of Missing Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| **PATHWAYS** | | | | |
| Evidence of Water Contamination — Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination — Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota — Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | 0 | 4 | 0 | 12 |
| Depth to Groundwater | 1 | 7 | 7 | 21 |
| Net Precipitation | 1 | 6 | 6 | 18 |
| Soil Permeability — Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability — Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | 0 | 4 | 0 | 12 |
| Surface Erosion | 1 | 4 | 4 | 12 |
| | | SUBTOTALS | 63 | 195 |
| | | SUBSCORE | | 32 |

Number of Assumed Values = 5 out of 10
Percentage of Assumed Values = 50%
Number of Missing Values = 0 out of 10
Percentage of Missing Values = 0%

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Old bombing range may contain unexployed ordinances

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity Assumed | 1 | 4 | 4 | 12 |
| Waste Incompatibility | 1 | 3 | 3 | 9 |
| Absence of Liners or Confining Beds | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | 3 | 6 | 18 | 18 |
| Use of Gas Collection Systems | 3 | 2 | 6 | 6 |
| Site Closure | 2 | 8 | 16 | 24 |
| Subsurface Flows | 0 | 7 | 0 | 21 |

Number of Assumed Values = 2 Out of 9
Percentage of Assumed Values = 22%
Number of Missing and Non-Applicable Values = 0 Out of 9
Percentage of Missing and Non-Applicalbe Values = 0%

SUBTOTALS 86 150
SUBSCORE 57
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 8 Out of 25
Overall Percentage of Assumed Values = 32%

OVERALL SCORE 47

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 5 - Coal Storage Area

Location: Adjacent to Power Plant Clear AFS

Owner/Operator: Clear AFS

Comments: Possible leachate problem

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 1 | 4 | 4 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |

Number of Assumed Values = 1 out of 6

Percentage of Assumed Values = 17 %

Number of Missing Values = 0 out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 91 138

SUBSCORE 66

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 0 | 10 | 0 | 30 |
| Level of Water Contamination | Assumed | 0 | 15 | 0 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |

Number of Assumed Values = 5 out of 10

Percentage of Assumed Values = 50 %

Number of Missing Values = 0 out of 10

Percentage of Missing Values = 0 %

SUBTOTALS 38 195

SUBSCORE 19

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Leachate from coal could cause a problem

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 0 | 7 | 0 | 21 |
| Hazardous Waste Quantity | | 0 | 7 | 0 | 21 |
| Total Waste Quantity | | 0 | 4 | 0 | 12 |
| Waste Incompatibility | | 0 | 3 | 0 | 9 |
| Absence of Liners or Confining Beds | Assumed | 1 | 6 | 6 | 18 |
| Use of Leachate Collection System | | 3 | 6 | 18 | 18 |
| Use of Gas Collection Systems | | 3 | 2 | 6 | 6 |
| Site Closure | N/A | — | 8 | — | — |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 1 Out of 9
Percentage of Assumed Values = 11 %
Number of Missing and Non-Applicable Values = 1 Out of 9
Percentage of Missing and Non-Applicalbe Values = 11 %

SUBTOTALS 30 126
SUBSCORE 24
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 7 Out of 25
Overall Percentage of Assmed Values = 28 %

OVERALL SCORE 38

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site Site No. 6 -- Leachate Field Septic Tank
Location Southeast of Dorms, Clear AFS
Owner/Operator Clear AFS
Comments Domestic wastewater, including wastewater from photo lab before the current practice of silver recovery.

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 87 | 138 |
| | | | SUBSCORE | | 63 |

Number of Assumed Values = 1 Out of 6
Percentage of Assumed Values = 17 %
Number of Missing Values = 0 Out of 6
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 63 | 195 |
| | | | SUBSCORE | | 32 |

Number of Assumed Values = ____ Out of 10
Percentage of Assumed Values = ____ %
Number of Missing Values = ____ Out of 10
Percentage of Missing Values = ____ %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 40

Reason for Assigned Hazardous Rating:

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | N/A | – | 7 | – | – |
| Hazardous Waste Quantity | | 0 | 7 | 0 | 21 |
| Total Waste Quantity | | 1 | 4 | 4 | 12 |
| Waste Incompatibility | | 0 | 3 | 0 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | – | 6 | – | – |
| Use of Gas Collection Systems | N/A | – | 2 | – | – |
| Site Closure | N/A | – | 8 | – | – |
| Subsurface Flows | | 0 | 7 | 0 | 21 |
| | | | SUBTOTALS | 22 | 81 |
| | | | SUBSCORE | | 27 |

Number of Assumed Values = 0 Out of 9

Percentage of Assumed Values = 0 %

Number of Missing and Non-Applicable Values = 4 Out of 9

Percentage of Missing and Non-Applicalbe Values = 44 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 6 Out of 25

Overall Percentage of Assumed Values = 24 %

OVERALL SCORE 39

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 7 -- 50,000 gallon oil spill site
Location: Adjacent Utildor east of power plant Clear AFS
Owner/Operator: Clear AFS
Comments: Oil spill took place in early 60's also oil with water pumped through drainage ditches

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 1 | 4 | 4 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |

Number of Assumed Values = 1 out of 6
Percentage of Assumed Values = 17 %
Number of Missing Values = 0 out of 6
Percentage of Missing Values = 0 %

SUBTOTALS 91 138
SUBSCORE 66
(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 0 | 10 | 0 | 30 |
| Level of Water Contamination | Assumed | 0 | 15 | 0 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |

Number of Assumed Values = 5 out of 10
Percentage of Assumed Values = 50 %
Number of Missing Values = 0 out of 10
Percentage of Missing Values = 0 %

SUBTOTALS 38 195
SUBSCORE 19
(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating: Oil spill

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 2 | 7 | 14 | 21 |
| Hazardous Waste Quantity | Assumed | 1 | 7 | 7 | 21 |
| Total Waste Quantity | Assumed | 1 | 4 | 4 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | — | 6 | — | — |
| Use of Gas Collection Systems | N/A | — | 2 | — | — |
| Site Closure | N/A | — | 8 | — | — |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 out of 9
Percentage of Assumed Values = 33%
Number of Missing and Non-Applicable Values = 3 out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 49 102
SUBSCORE 48
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = ____ Out of 25
Overall Percentage of Assumed Values = ____%

OVERALL SCORE 46

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 8 Underground Storage Tank

Location: Behind Power Plant, Clear AFS

Owner/Operator: Clear AFS

Comments: Possible fuel spills
ONE SPILL KNOWN TO HAVE OCCURRED
APPROX 200 GALLONS IN APR, 1981

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 1 | 4 | 4 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |

Number of Assumed Values = 1 Out of 6

Percentage of Assumed Values = 17 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

SUBTOTALS 91 138

SUBSCORE 66

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 0 | 15 | 0 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |

Number of Assumed Values = 4 Out of 10

Percentage of Assumed Values = 40 %

Number of Missing Values = 0 Out of 10

Percentage of Missing Values = 0 %

SUBTOTALS 48 195

SUBSCORE 25

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating: Possible oil spills

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 2 | 7 | 14 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 0 | 4 | 0 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | — | 6 | — | — |
| Use of Gas Collection Systems | N/A | — | 2 | — | — |
| Site Closure | N/A | — | 8 | — | — |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 out of 9
Percentage of Assumed Values = 33%
Number of Missing and Non-Applicable Values = 3 out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 32 102
SUBSCORE 31
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 8 out of 25
Overall Percentage of Assumed Values = 32%

OVERALL SCORE 41

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 10 - Radioactive Storage Building

Location: Behind Supply Building

Owner/Operator: Clear AFS

Comments: Dump site for small quantity radioactive tubes

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 3 | 4 | 12 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 99 | 138 |
| | | | SUBSCORE | | 72 |

Number of Assumed Values = 1 Out of 6
Percentage of Assumed Values = 17 %
Number of Missing Values = 0 Out of 6
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 0 | 10 | 0 | 30 |
| Level of Water Contamination | Assumed | 0 | 15 | 0 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 38 | 195 |
| | | | SUBSCORE | | 19 |

Number of Assumed Values = 5 Out of 10
Percentage of Assumed Values = 50 %
Number of Missing Values = ___ Out of 10
Percentage of Missing Values = ___ %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Dump for radioactive tubes

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 0 | 4 | 0 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | — | 6 | — | — |
| Use of Gas Collection Systems | N/A | — | 2 | — | — |
| Site Closure | N/A | — | 8 | — | — |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 Out of 9

Percentage of Assumed Values = 33%

Number of Missing and Non-Applicable Values = 3 Out of 9

Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 45 102

SUBSCORE 44

(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 9 Out of 25

Overall Percentage of Assumed Values = 36%

OVERALL SCORE 44

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 11 -- Fire Training Area

Location: East of Construction Camp

Owner/Operator: Clear AFS

Comments: Used oil products for fire training

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 1 | 4 | 4 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |

Number of Assumed Values = 1 out of 6
Percentage of Assumed Values = 17 %
Number of Missing Values = 0 out of 6
Percentage of Missing Values = 0 %

SUBTOTALS 91 138
SUBSCORE 66
(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 0 | 10 | 0 | 30 |
| Level of Water Contamination | Assumed | 0 | 15 | 0 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 0 | 5 | 0 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |

Number of Assumed Values = 5 out of 10
Percentage of Assumed Values = 50 %
Number of Missing Values = 0 out of 10
Percentage of Missing Values = 0 %

SUBTOTALS 33 195
SUBSCORE 17
(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 40

Reason for Assigned Hazardous Rating:
Fire training area use fuel for fire igniting

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 0 | 4 | 0 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | — | 6 | — | — |
| Use of Gas Collection Systems | N/A | — | 2 | — | — |
| Site Closure | N/A | — | 8 | — | — |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 Out of 9
Percentage of Assumed Values = 33%
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 45 102
SUBSCORE 44
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 9 Out of 25
Overall Percentage of Assumed Values = 36%

OVERALL SCORE 40

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 12 -- Location suspicious drums

Location: Near old Gravel Sorter south of Construction Camp

Owner/Operator: Clear AFS

Comments: Some liquid was leaking from drums and spilled onto ground

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 87 | 138 |
| | | | SUBSCORE | | 63 |

Number of Assumed Values = 1 out of 6

Percentage of Assumed Values = 17 %

Number of Missing Values = 0 out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 63 | 195 |
| | | | SUBSCORE | | 32 |

Number of Assumed Values = 5 out of 10

Percentage of Assumed Values = 50 %

Number of Missing Values = 0 out of 10

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating: Drums were leaking unknown liquid

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 0 | 4 | 0 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | — | 6 | — | — |
| Use of Gas Collection Systems | N/A | — | 2 | — | — |
| Site Closure | N/A | — | 8 | — | — |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 out of 9
Percentage of Assumed Values = 33%
Number of Missing and Non-Applicable Values = 3 out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 45 102
SUBSCORE 44
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 9 out of 25
Overall Percentage of Assumed Values = 36%

OVERALL SCORE 46

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 13 - Suspicious Drums

Location: Less than 1 mile south of Power Plant

Owner/Operator: Clear AFS

Comments: 4 drums located containing small amounts of liquid possibly pesticides

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 87 | 138 |
| | | | SUBSCORE | | 52 |

Number of Assumed Values = 1 out of 6

Percentage of Assumed Values = 17 %

Number of Missing Values = 0 out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 63 | 195 |
| | | | SUBSCORE | | 32 |

Number of Assumed Values = 5 out of 10

Percentage of Assumed Values = 50 %

Number of Missing Values = 0 out of 10

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating:
Possible pesticides

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 0 | 4 | 0 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | – | 6 | – | – |
| Use of Gas Collection Systems | N/A | – | 2 | – | – |
| Site Closure | N/A | – | 8 | – | – |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 Out of 9
Percentage of Assumed Values = 33%
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 45 102
SUBSCORE 44
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 9 Out of 25
Overall Percentage of Assmued Values = 36%

OVERALL SCORE 46

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 14 - Construction Camp Disposal Area
Location: South of Construction Camp
Owner/Operator: Clear AFS
Comments: Site used for dumping during construction

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 1 | 4 | 4 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 91 | 138 |
| | | | SUBSCORE | | 66 |

Number of Assumed Values = 1 out of 6
Percentage of Assumed Values = 17 %
Number of Missing Values = 0 out of 6
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 0 | 10 | 0 | 30 |
| Level of Water Contamination | Assumed | 0 | 15 | 0 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 0 | 5 | 0 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 33 | 195 |
| | | | SUBSCORE | | 17 |

Number of Assumed Values = 5 out of 10
Percentage of Assumed Values = 50 %
Number of Missing Values = 0 out of 10
Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

**Hazardous Rating:** Judgemental rating from 30 to 100 points based on the following guidelines:

**Points**

| | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 30

Reason for Assigned Hazardous Rating:

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 1 | 4 | 4 | 12 |
| Waste Incompatibility | Assumed | 1 | 3 | 3 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | | 3 | 6 | 18 | 18 |
| Use of Gas Collection Systems | | 3 | 2 | 6 | 6 |
| Site Closure | | 2 | 8 | 16 | 24 |
| Subsurface Flows | | 0 | 7 | 0 | 21 |
| | | | SUBTOTALS | 86 | 150 |
| | | | SUBSCORE | | 57 |

(Factor Score Divided by Maximum Score and Multiplied by 100)

Number of Assumed Values = 3 Out of 9

Percentage of Assumed Values = 33%

Number of Missing and Non-Applicable Values = 0 Out of 9

Percentage of Missing and Non-Applicalbe Values = 0%

Overall Number of Assumed Values = 9 Out of 25

Overall Percentage of Assumed Values = 36%

OVERALL SCORE 40

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

# WASTE DISPOSAL SITE AND SPILL AREA ASSESSMENT AND RATING FORM

Name of Site: Site No. 15 -- Lake Sansing

Location: Near abandoned air strip NW

Owner/Operator: Clear AFS

Comments: Boiler blowdown, oily water, cooling water domestic water discharged to this man-made lake

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **RECEPTORS** | | | | | |
| Population Within 1,000 Feet | | 0 | 4 | 0 | 12 |
| Distance to Nearest Drinking Water Well | | 3 | 15 | 45 | 45 |
| Distance to Reservation Boundary | | 0 | 6 | 0 | 18 |
| Land Use/Zoning | | 0 | 3 | 0 | 9 |
| Critical Environments | | 3 | 12 | 36 | 36 |
| Water Quality of Nearby Surface Water Body | Assumed | 1 | 6 | 6 | 18 |
| | | | SUBTOTALS | 87 | 138 |
| | | | SUBSCORE | | 63 |

Number of Assumed Values = 1 Out of 6

Percentage of Assumed Values = 17 %

Number of Missing Values = 0 Out of 6

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| **PATHWAYS** | | | | | |
| Evidence of Water Contamination | Assumed | 1 | 10 | 10 | 30 |
| Level of Water Contamination | Assumed | 1 | 15 | 15 | 45 |
| Type of Contamination, Soil/Biota | Assumed | 1 | 5 | 5 | 15 |
| Distance to Nearest Surface Water | | 0 | 4 | 0 | 12 |
| Depth to Groundwater | | 1 | 7 | 7 | 21 |
| Net Precipitation | | 1 | 6 | 6 | 18 |
| Soil Permeability | Assumed | 2 | 6 | 12 | 18 |
| Bedrock Permeability | Assumed | 1 | 4 | 4 | 12 |
| Depth to Bedrock | | 0 | 4 | 0 | 12 |
| Surface Erosion | | 1 | 4 | 4 | 12 |
| | | | SUBTOTALS | 63 | 195 |
| | | | SUBSCORE | | 32 |

Number of Assumed Values = 5 Out of 10

Percentage of Assumed Values = 50 %

Number of Missing Values = 0 Out of 10

Percentage of Missing Values = 0 %

(Factor Score Divided by Maximum Score and Multiplied by 100)

## WASTE CHARACTERISTICS

Hazardous Rating: Judgemental rating from 30 to 100 points based on the following guidelines:

| Points | |
|---|---|
| 30 | Closed domestic-type landfill, old site, no known hazardous wastes |
| 40 | Closed domestic-type landfill, recent site, no known hazardous wastes |
| 50 | Suspected small quantities of hazardous wastes |
| 60 | Known small quantities of hazardous wastes |
| 70 | Suspected moderate quantities of hazardous wastes |
| 80 | Known moderate quantites of hazardous wastes |
| 90 | Suspected large quantities of hazardous wastes |
| 100 | Known large quantities of hazardous wastes |

SUBSCORE 50

Reason for Assigned Hazardous Rating: Oily water discharged to lake

## WASTE MANAGEMENT PRACTICES

| RATING FACTOR | | FACTOR RATING (0-3) | MULTIPLIER | FACTOR SCORE | MAXIMUM POSSIBLE SCORE |
|---|---|---|---|---|---|
| Record Accuracy and Ease of Access to Site | | 3 | 7 | 21 | 21 |
| Hazardous Waste Quantity | Assumed | 0 | 7 | 0 | 21 |
| Total Waste Quantity | Assumed | 0 | 4 | 0 | 12 |
| Waste Incompatibility | Assumed | 2 | 3 | 6 | 9 |
| Absence of Liners or Confining Beds | | 3 | 6 | 18 | 18 |
| Use of Leachate Collection System | N/A | – | 6 | – | – |
| Use of Gas Collection Systems | N/A | – | 2 | – | – |
| Site Closure | N/A | – | 8 | – | – |
| Subsurface Flows | | 0 | 7 | 0 | 21 |

Number of Assumed Values = 3 Out of 9
Percentage of Assumed Values = 33%
Number of Missing and Non-Applicable Values = 3 Out of 9
Percentage of Missing and Non-Applicalbe Values = 33%

SUBTOTALS 45 102
SUBSCORE 44
(Factor Score Divided by Maximum Score and Multiplied by 100)

Overall Number of Assumed Values = 9 Out of 25
Overall Percentage of Assumed Values = 36%

OVERALL SCORE 46

(Receptors Subscore x 0.22 plus
Pathways Subscore x 0.30 plus
Waste Characteristics Subscore x 0.24 plus
Waste Management Subscore x 0.24)

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